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Alternative Transportation Modes
Feasibility Study
Volume III

YELLOWSTONE

National Park • Wyoming

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Feasibility Study
Volume III

July 1994

YELLOWSTONE
National Park • Wyoming

United States Department of the Interior • National Park Service • Denver Service Center
Prepared by BRW, Inc., in association with Dames & Moore

This study has been prepared by BRW, Inc. and Dames and Moore under the direction of the Branch of Transportation, Denver Service Center, National Park Service. The study has been reviewed by the National Park Service and the U.S. Department of Transportation. Appropriate changes have been incorporated based on these reviews. NPS staff have provided assistance, review, and guidance during the course of the study. Special thanks are extended to the staff of Yellowstone National Park for their assistance in collecting and assembling the data used in the study. The staff of TW Recreational Services are also recognized for their contributions.

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PURPOSE

Section 1050 of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240, directed that a study be conducted of alternatives to the private vehicle for visitor transportation in the national park system. Because of congressional intent and interest, the study used Denali National Park and Preserve and Yellowstone and Yosemite national parks as case study examples. Each of these park units has special transportation problems.

The major purpose of this study, as stated in the act, is to evaluate the following:

1. The economic and technical feasibility, environmental effects, projected costs, and benefits as compared to the costs and benefits of existing transportation systems, and general suitability of transportation modes that would provide efficient and environmentally sound ingress to and egress from national park lands; and
2. Methods to obtain private capital for the construction of such transportation modes and related infrastructure.

The study included an evaluation of specific alternatives to private vehicle travel in each of the three parks and a comprehensive inventory of transportation technologies that can serve visitor transportation needs within the national park system.

Transportation problems in the national park system are a cause for increasing concern. The issues leading to this study included the following:

- increasing traffic congestion in many park units, indicating a need for alternative transportation modes to enhance resource protection
- potential enhancement of the visitor experience and reduced vehicular congestion with the increased use of visitor transportation systems
- accelerating rates of deterioration of park roads from increased traffic, age, and lack of adequate maintenance funding
- rapidly expanding roadway construction and reconstruction needs

The information presented in this study is intended for use in the conceptual development and evaluation of alternatives to private vehicle travel in Yellowstone National Park. It provides a preliminary assessment of the feasibility of visitor transportation system options in the park. More in-depth engineering and environmental impact analyses of specific conditions will be required to confirm the cost estimates and to conform to the National Environmental Policy Act and other legislative requirements for proposed improvements in units of the national park system.

PREFACE

The results of the *Alternative Transportation Modes Feasibility Study* are presented in four separate volumes. This volume, Volume III, presents the findings of the feasibility study for Yellowstone National Park. Volume I provides an overview of transportation planning for national park units and an inventory of alternatives to private vehicle travel within parks. Volumes II and IV present the results of evaluations of alternative transportation systems for Denali National Park and Preserve and Yosemite National Park, respectively.

Throughout the *Alternative Transportation Modes Feasibility Study*, only those transportation technologies that have been proven in everyday use have been evaluated in detail. Volume I identifies emerging technologies that show the greatest promise for future application in the national park system. As these and other new technologies are developed and proven, a broader range of options may be available for use in park units.

The study has concentrated on transportation within and near Yellowstone. The transportation of visitors to the park from remote locations was not considered directly during this study. However, the National Park Service (NPS) recognizes the value of integrating the planning of transportation systems within the parks with the efforts of surrounding communities to address transportation issues. Visitor transportation systems in the parks must respond to transportation requirements that will vary depending on visitors' means of traveling to the parks.

Undoubtedly, many opportunities will be available to enhance the economic development potential of gateway communities and to reduce the impacts of transportation on park resources by providing innovative transportation systems based in the gateway communities. Such systems could be extensions of or complements to internal visitor transportation systems. A cooperative approach to visitor access and internal park transportation could enhance efforts to preserve regional ecosystems while improving the overall quality of visitor experiences in national parks.

The movement of visitors to and between attractions within parks accounts for the majority of travel within the national park system. Consequently, the resources available for this study have been concentrated on the question of how best to serve the transportation needs of visitors. Frequently, the transportation of NPS and concessioner employees is also an issue, especially at the larger park units. Specific planning efforts in each park unit should explore the opportunity to address both visitor and employee transportation needs with alternative transportation systems. The ability to serve both groups of travelers with a single system will depend on the location of employee housing, an issue that is outside the scope of this study.

Transportation planning for parks is but one element of a complete and systematic planning process that is conducted to determine the future of the nationally significant areas that have been set aside as units of the national park system. As urban planning professionals have recognized that effective land use and transportation decisions cannot be made independently, recreation and park planners and managers have increasingly embraced the idea of coordinated planning for resource management, visitor facilities, and transportation systems.

Transportation systems in national parks play a crucial role in determining the quality of visitor experience in the parks and have a strong influence on resource preservation. In developing transportation alternatives for Yellowstone and other units of the national park system, management and staff should consider how those alternatives can best support the broader purpose and values of the National Park Service and the individual park.

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EXECUTIVE SUMMARY

YELLOWSTONE OVERVIEW

Yellowstone National Park encompasses 2,221,722 acres within a mountainous plateau in the northern Rocky Mountains. The commanding features that initially attracted interest, and led to the reservation of Yellowstone as a national park, were geological — the geothermal phenomena, the colorful Grand Canyon of the Yellowstone, the fossil forests, and the size and elevation of Yellowstone Lake. With the establishment of the park road system known as the Grand Loop Road, the natural features and pristine conditions within the park became accessible to literally millions of people.

The entire Grand Loop Road lies within landscape settings of significant visual quality. Today, Yellowstone is considered one of the premier wildlife viewing units in the national park system. The pristine conditions; the striking geological, thermal, and hydrological features; and the presence and variety of wildlife all contribute to the outstanding visitor experiences offered by Yellowstone.

In addition to the natural resources of the park, Yellowstone contains significant cultural resources. There are 952 historic structures on the List of Classified Structures; of these, 553 have been determined to be eligible for listing or are listed on the National Register of Historic Places.

The Grand Loop Road network has contributed to the unique character of the park by providing visitors with a sense of freedom to explore the resources on their own terms, stopping at almost any location while using their own transportation. Visitors have the ability to enter and exit the park through any five gateways, each of which provides distinctive touring opportunities. A visitor survey, conducted in August 1993, revealed that only 23% of all visitors made trips through the park from one gateway to another.

Current traffic volumes and road system limitations have resulted in recurring traffic congestion and long delays. To compound the congestion problems during the peak season, traffic backups associated with wildlife sightings are common. Visitors often stop their vehicles in a travel lane and leave them in pursuit of a better viewpoint.

Yellowstone is considered one of the premier wildlife viewing units in the national park system.

In addition to presenting visitors with unpredictable and lengthy delays, congestion also adversely affects the administrative functions of the National Park Service and the concessioners. Park Service and concessioner employees, delivery drivers, law enforcement personnel, tour bus drivers, and passengers are all affected by disruptions in traffic flow.

Increasing traffic volumes, heavy vehicles, and severe winter weather have damaged road surfaces and accelerated erosion near roadways. A 1988 evaluation rated 28% of the Yellowstone road system in good or fairly good condition, with the remaining 72% rated fair to very poor. The *Parkwide Road Improvement Plan*, completed in 1992, calls for a long-term program of road improvements consisting of a combination of major reconstruction (MR) projects for severely deteriorated roadway segments and resurfacing, restoration, and rehabilitation (3R) projects to improve the condition and extend the life of other road segments in Yellowstone. A total of 112 miles of 3R and 184 miles of MR improvements are included in the plan.

As visitation has grown, the volume of traffic using the road system has approached the capacity of the existing roads. Expanding the roadway system to accommodate more vehicles would not be compatible with the preservation of the park's unique resources, since visitor crowding is now a problem at most popular activity areas and road widening could cause severe impacts to the park's natural environment.

During the peak visitation season, Yellowstone visitors, most of whom are family groups, tend to cluster in a few developed areas that are easily accessible by private vehicle, notably at the international icon of Old Faithful. Other popular summer destinations that receive substantial visitation and have related access problems include Canyon Village, Grant Village/West Thumb, Madison, Norris Geyser Basin, Mammoth Hot Springs, Fishing Bridge/Lake Village/Bridge Bay, and Tower-Roosevelt.

Transportation has been a prominent issue in Yellowstone for over two decades. Traffic volumes on roadways have continued to increase but funding for maintenance and rehabilitation has not kept pace with deterioration of the road system. Because of the heavy reliance on personal transportation, and the concentration of visitor use along the Grand Loop Road, congested conditions occur in many areas of the park.

This report describes opportunities to reduce the negative impacts of visitor traffic through the implementation of visitor transportation systems in major activity areas in Yellowstone National Park. Separating visitors from their vehicles poses many difficult challenges. Despite the obstacles, alternative modes of transportation may offer a viable means to protect resources and improve visitor experience in Yellowstone. The feasibility study developed alternatives to private vehicles on Yellowstone roads during the primary visitation period of May through October; it did not address options for winter travel.

The constant presence of vehicles can conflict with the natural character of Yellowstone.

In October 1992, study contractor and National Park Service staff met with representatives of the chambers of commerce of Cody and Jackson Wyoming, West Yellowstone Montana, and the staff of the Greater Yellowstone Coalition to identify study issues and to discuss the purpose of the study.

VISITATION

Peak Season

Yellowstone National Park is one of the most popular tourist attractions in the United States. Over 3 million people visited the park in 1992. Annual visitation has been steadily increasing over the last decade, as shown in figure ES-1.

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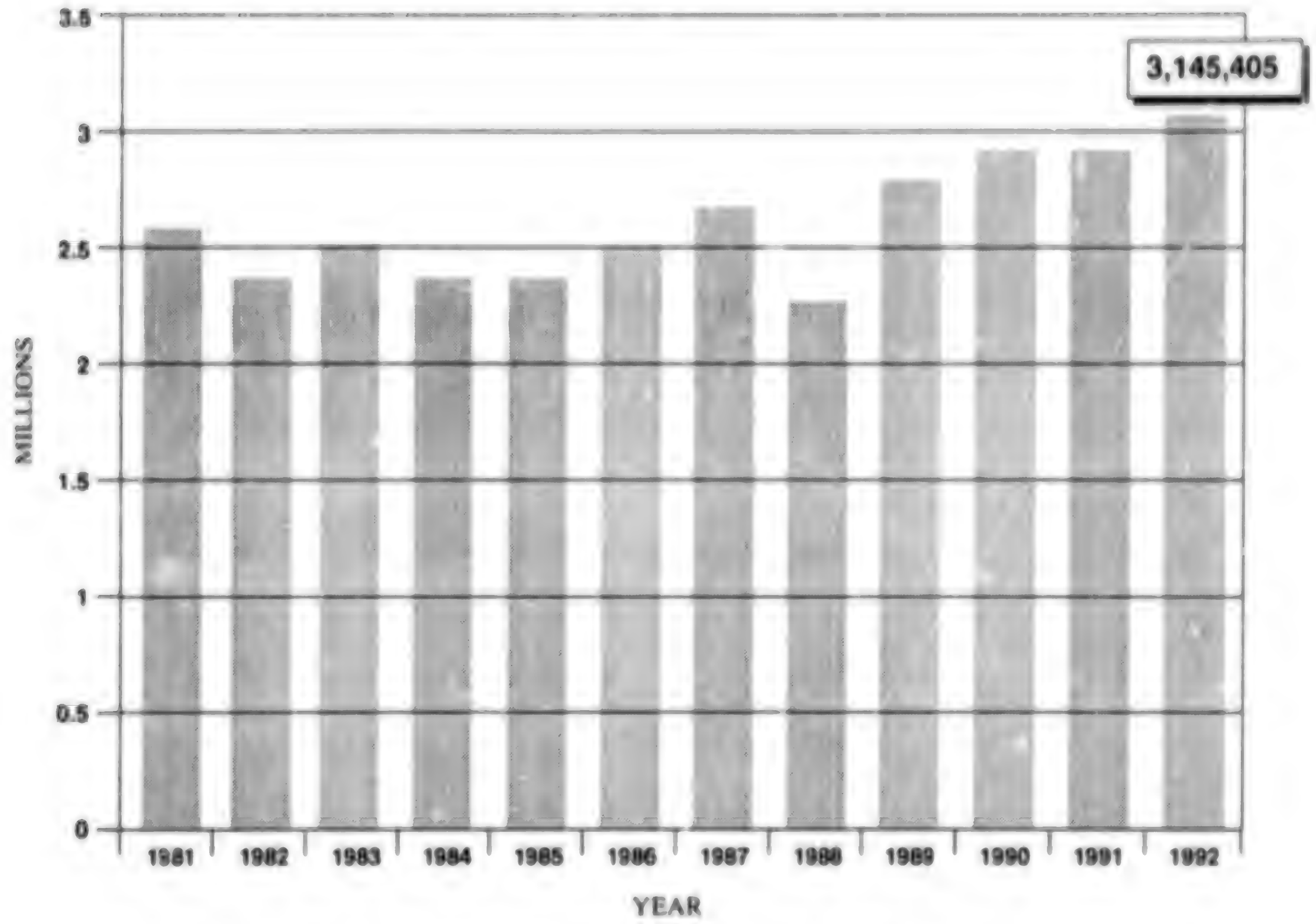
Figure ES-1: Yellowstone National Park
Annual Park Visitation



Source: Yellowstone National Park Statement for Management 1991 (1981-1990); Office of Visitor Services (1991)

Yellowstone is one of the most popular tourist attractions in the United States.

Visitation to Yellowstone increases gradually in the early spring as roadways are cleared of snow, and peaks in July and August. Figure ES-2 shows monthly visitation totals for 1991. Visitation during the peak months accounts for approximately two-thirds of the total visitation, as indicated in table ES-1.

During a typical summer day, 84% of Yellowstone visitors are clustered in the park campgrounds, thermal and scenic viewing areas, and the developed areas along the park roadways. Only 7% of visitors hike off the main roadways into the park backcountry. The Park Service estimates that 20,000 to 25,000 people are within the park during a typical peak season evening.

Non Peak Season

In the last two decades, visitation to Yellowstone during the "shoulder seasons" (the spring and fall periods before and after the peak summer season) has increased gradually. Although small in absolute terms, winter visitation to the greater Yellowstone area is increasing rapidly, nearly doubling in the last ten years. Recreational activities such as snowmobiling and ski touring have become popular. Table ES-2 shows that from 1990 through 1992 visitation during January through April accounted for about 3% of all park visits. From a base of no winter visits 30 years ago, the Park Service counted more than 140,000 visits to Yellowstone in the 1992-1993 winter season.

To date, maximum daily visitation levels have not been established for activity areas within the park. The capacity of transportation facilities generally dictate the limits of visitor use. On the busiest summer days, parking occupancy studies and traffic volumes indicate that visitation levels at Yellowstone are approaching the limits of efficient management in specific areas. Existing parking capacities, visitor center use estimates, and peak season average daily traffic counts were used to develop estimates of demand for the visitor transportation system (VTS) alternatives evaluated in this study.

TRANSPORTATION IN YELLOWSTONE

The Grand Loop Road system of Yellowstone National Park follows a rough figure-eight path. Roads leading from the park entrance stations intersect the Grand Loop Road at five locations. The west entrance station accommodates the greatest number of entries, with 34% of 1992 peak season traffic. The John D. Rockefeller, Jr. Memorial Parkway, linking Grand Teton Park to the south entrance of Yellowstone, is the next most popular, accounting for 26% of all visitors. The percentage of entering vehicles by station is shown in figure ES-3.

Although the northeast entrance currently receives the fewest park entries, planned improvements to the roadway system outside the park boundary may stimulate an increase in its use. The Chief Joseph Scenic Highway, between U.S. Highways 212 and 14/16/20 through the Sunlight Basin area, is being upgraded to a paved, all-weather facility. The improvements will provide a principal roadway

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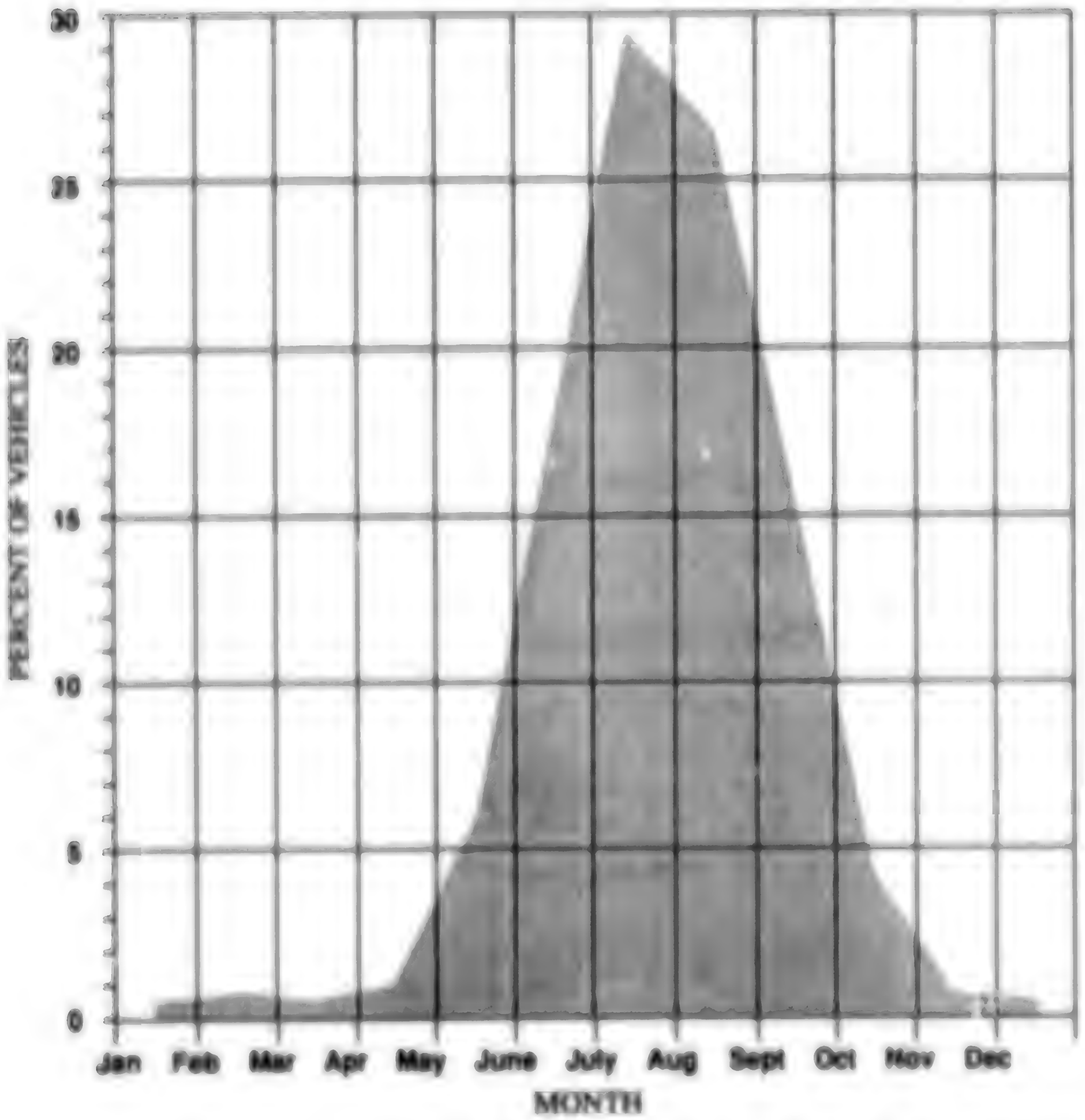
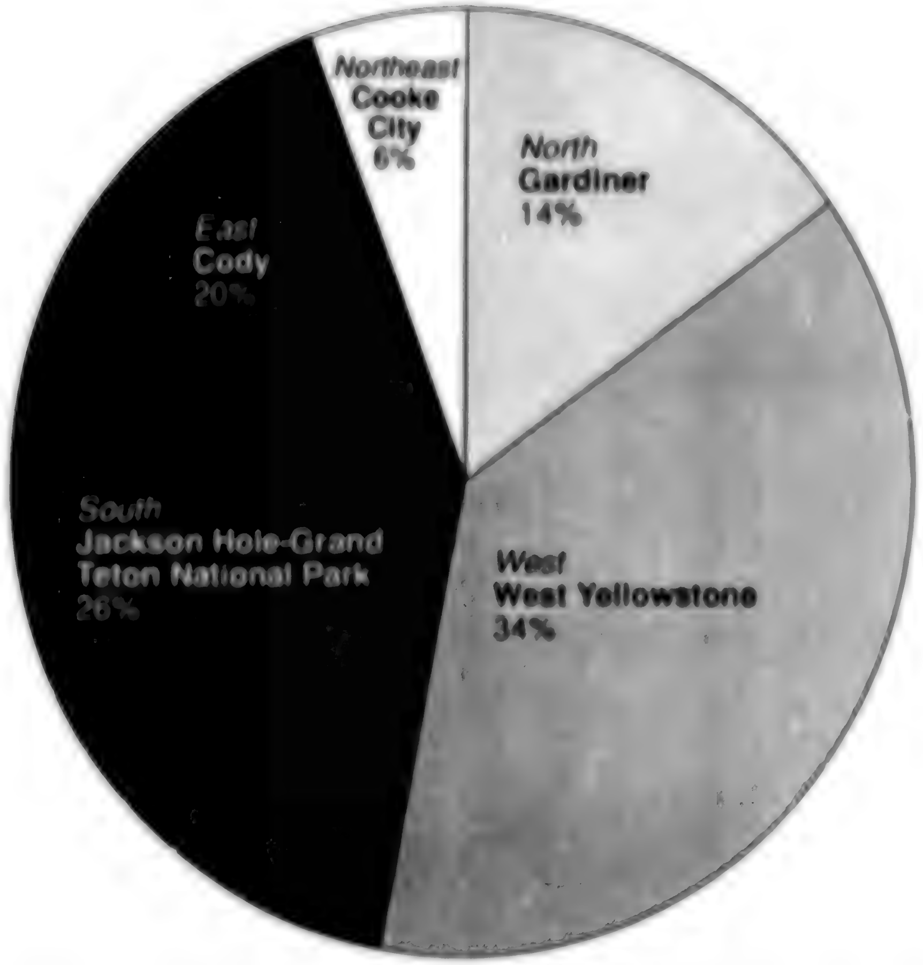
Figure ES-2: Yellowstone National Park
Year 1991 Monthly Park Visitation



Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

Figure ES-3: Yellowstone National Park
Year 1992 Vehicles Entering by Gate



Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

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Table ES-1: Peak Season and Total Annual Visitation

Year	Total Visitation	Visitation June-August	% of Total Visitation
1990	2,857,096	1,981,888	69
1991	2,957,856	2,038,146	68
1992	3,145,000	2,082,249	66

Source: Yellowstone National Park, Office of Visitor Services

Table ES-2: Winter Season Visitation As A Percentage of Total Visitation

Year	Total Visitation	Visitation January-April	% of Total Visitation
1990	2,857,096	79,384	2.7
1991	2,957,856	88,890	3.0
1992	3,145,000	95,184	3.2

Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

The west entrance has the greatest number of park entries.

link between Cody, Wyoming and Cooke City, Montana, and could possibly allow for year-round access to the northeast entrance of Yellowstone from the east. The roadways east of Cooke City are currently closed in the winter, requiring wheeled vehicles to reach Cooke City via Mammoth and the north park entrance exclusively. Improvement of the Chief Joseph Scenic Highway may also change summer visitor use patterns by facilitating loop tours from Cody through the east and northeast entrances.

The travel patterns of visitors within Yellowstone have a significant influence on the viability of VTS alternatives. A recent study found that over 80% of all Yellowstone visitors visited another national park as part of their trip. While inside the park, visitors typically want to see as much as possible in a short amount of time and most want to enter and leave the park at different entrances. As a result, many Yellowstone visitors could be greatly inconvenienced if they were required to stop at a location outside the park and use a visitor transportation system to reach activity areas in the park.

The principal alternatives to personal transportation available in Yellowstone are bus tours offered by TW Recreational Services (TWRS). A fleet of 41 concession tour buses provide access to all of the park's major developed areas along five routes. The tours range in round-trip length from 100 to 150 miles. The bus drivers provide interpretation of the park's history and significant features along the way. Although TWRS has designed the bus tours primarily to serve interpretive needs, there is some use of the buses for shuttle service between developed areas and lodging facilities. Almost 7,000 visitors took bus tours of Yellowstone in 1992. According to TWRS

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Tour vans are used by Grand Teton Lodge near Jackson, Wyoming.

officials, the number of tour bus passengers has declined in recent years.

In addition to the TWRS bus operations, three other private companies provide transportation services in the park under commercial use licenses. Summary totals of all bus passengers for 1990 and 1991 indicate that approximately 90,000 to 100,000 visitors entered Yellowstone in buses, representing approximately 3% of all park visitors.

Boat tours on Lake Yellowstone are available during the summer season. As many as eight one-hour rides are available from Bridge Bay during the summer season. Passenger demand has been fairly consistent from year to year, with an average of just under 200 passengers per day during the peak month. Rough water and unpredictable weather tend to limit cross-lake travel. These conditions would make it difficult to provide regular shuttle service between Bridge Bay and Grant Village on boats.

Although most transportation in the park between March and November is by private auto, truck, and recreational vehicle (RV), travel between December and February shifts to snowmobiles and snow coaches because most park roads are closed to wheeled vehicles. The majority of snowmobile trips and snow coach tours originate from West Yellowstone, at the park's west entrance station, and Flagg Ranch, several miles south of the park along the John D. Rockefeller Jr. Memorial Parkway. Winter season visitors and snowcoach passengers are accommodated in two lodging facilities operated by TWRS — the Old Faithful Snow Lodge and the Mammoth Hot Springs Hotel.

Average daily traffic (ADT) volumes in the park for the year 1992 are provided on the accompanying map. The highest seasonal average daily traffic (SADT) counts are at Old Faithful and in the Hayden Valley, with over 7,000 vehicles east of Old Faithful. Volumes along segments of the lower portion of the Grand Loop Road are higher than the upper sections. The lower loop provides the most direct connections between three of the busiest park entrance roads (west, south, and east). The segment of road between the northeast entrance and Tower-Roosevelt had the lowest SADT count along the loop in 1992, with approximately 3,000 vehicle trips per day.

Frequent interruptions to traffic flow are caused by visitors stopping to view wildlife, resulting in long lines of vehicles on nearly every roadway segment.

DEVELOPMENT AND SCREENING OF VTS ALTERNATIVES

Criteria were prepared to guide the development of transportation system alternatives, assist in the initial screening of alternatives to a small set of feasible options, and to compare the feasible alternatives for Yellowstone. The criteria were developed to respond to the study purpose as stated in the Intermodal Surface Transportation Efficiency Act and to account for the unique transportation problems and environmental conditions in Yellowstone. The criteria included essential requirements and a series of measures against which the alternatives could be compared.

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Essential Requirements

To be considered for detailed evaluation, transportation improvement alternatives for Yellowstone were required to have the following essential characteristics:

- Be able to accommodate estimated visitation or ridership levels in the areas to be served.
- Afford a meaningful reduction in private vehicle travel.
- Allow current visitor use patterns to continue, including the ability to conveniently visit more than one area of the park, enter and exit the park via different entrances, and allow visitors to experience a full range of scenic and wildlife-oriented activities.
- Have the potential to reduce vehicular emissions.
- Have the potential to reduce energy consumption associated with transportation.
- Maintain visual quality in key areas.
- Employ proven, available technologies for visitor transportation systems.
- Be capable of operating in a safe manner in the Yellowstone environment.
- Comply with the requirements of the Americans with Disabilities Act.
- Allow safe and unrestricted movement of wildlife across and along the transportation system corridors.
- Provide the opportunity for healing and improvement of existing road edge habitat.
- Have the potential to manage visitor encroachment into sensitive natural areas.

Evaluation Measures

Comparative measures for evaluation of those alternatives that met the essential requirements were developed in the following categories: visitor transportation and management, visitor experience, resource impacts, consistency with planning goals, cost and cost-effectiveness, and implementation.

Visitor Transportation Service Concepts

Because of the diverse travel desires of visitors to Yellowstone, a range of VTS service concepts are potentially viable. Among the possible concepts are:

- a parkwide mandatory transportation system
- a parkwide voluntary transportation system
- an entrance station to activity area shuttle
- a Grand Loop segment shuttle between activity areas
- an activity area circulator

Parkwide Systems. If a parkwide visitor transportation system was implemented, it would probably attract few passengers unless it was mandatory. This is because visitors typically travel through the park, visiting a number of activity areas and features and spending one or more nights on the way. Most visitors enter and exit via different entrance stations, which means that using a transportation system for a portion of their trip would involve a substantial amount of extra travel and an overall delay. Because travel by personal vehicle would be viewed as more convenient than travel by a visitor transportation system, only a mandatory system could be expected to attract significant ridership.

A mandatory transportation system would prevent through trips in Yellowstone, so

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visitors would have to travel to other destinations using routes outside the park. In most cases, this would add many miles and hours to existing through-trips. Although this would be a consequence of a mandatory transportation system, such a system was developed and evaluated to illustrate the magnitude of investment and the size of facilities that would be required to remove all private vehicular traffic from Yellowstone.

The mandatory parkwide transportation system analyzed in this study would interrupt all day use and overnight visitor traffic at staging areas near each of the five entrance stations. Passengers would be transferred at these locations to a visitor transportation system for all of their travel within the park.

Six transit routes were developed to provide visitor access to all of the major activity areas. With the proposed routes, each major activity area could be reached with a maximum of one transfer, except for certain trips from the northeast entrance that would require two transfers. The following routes (displayed on the Parkwide VTS Alternative map) were included in the a parkwide visitor transportation system.

- west entrance to east entrance via Canyon
- east entrance to west entrance via West Thumb
- north entrance to Madison Junction via Norris
- northeast entrance to north entrance via Tower
- south entrance to Madison Junction via Old Faithful
- Tower to Canyon via Dunraven Pass

Major transfer facilities, where visitors could change from one VTS route to another, would be provided at Mammoth, Tower-Roosevelt, Norris, Canyon, Madison Junction, Lake/Fishing Bridge, and West Thumb. Old Faithful, Grant Village, and Bridge Bay would also be included as major transit stops. Additional activity areas along each route would be served by on-demand stops.

Motor coach buses were chosen to provide the service because they represent the most economical technology to provide service on the nearly 350 miles of two-way route that would need to be covered under this alternative. Buses would also offer the best opportunities for on-demand stops and would allow visitors to reach trailheads and other minor destinations. A cog rail system was selected to provide service on the Dunraven Pass route because of the steep grades and the poor condition of the existing road.

A mandatory parkwide visitor transportation system would influence two primary quantifiable aspects of visitor use and park management. First, large long term parking areas would be required at each entrance station. Second, in order to provide adequate capacity and convenient service to visitors, the VTS fleet would be large, and operating costs would be considerable.

A mandatory visitor transportation system would cause long delays to visitors coming to Yellowstone as part of larger travel itineraries that involve entering the park at one gate and leaving from another. Facilities for overnight accommodation reservations and confirmations, and visitor information and orientation, would be needed at each staging area. The system would also need to accommodate visitor luggage and equipment. Moving camping gear to camp sites would present a difficult challenge, and visitors arriving in recreational vehicles would be poorly served.

Table ES-3 provides a summary of the parking facilities and transit equipment needed for a mandatory parkwide transportation service. The passenger demand for the service was estimated based on 1992 peak season average daily traffic volumes into and within the park.

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Table ES-3: Costs and Operating Requirements for Parkwide VTS Routes

Requirements	West to East (via Canyon)	East to West (via West thumb)	North to Madison Junction (via Norris)	Northeast to North (via Tower)	South to Madison Junction (via Old Faithful)	Tower to Canyon (via Dunraven Pass)	Total System
Parking Spaces	3,411	3,206	1,785	1,711	2,902	NA	13,015
Parking Lot Area (acres)	37.9	35.6	19.8	19.0	32.2	NA	145.5
Round Trip Route Length (miles)	171	195	80	85	116	38	685
Transit Vehicles	238	216	59	65	129	31	738
Peak Period Service Intervals (min.)	2.0	2.5	4.0	3.75	2.5	6.0	
Construction and Equipment Costs (millions)	$81.3	$74.0	$22.6	$24.2	$46.8	$283.0	$531.9
Seasonal Operating and Maintenance Costs (millions)	$21.4	$20.1	$5.6	$6.3	$12.0	$7.2	$72.6
Annualized Cost Per Peak Season Visitor							$58.48

Source: BRW, Inc.

Notes:
- Costs represent total costs (contingency, planning and supervision percentages applied where appropriate) for vehicle fleet, rail alignment and parking spaces only
- Staging areas located at first entrance name in route titles
- NA = Not Applicable

The costs presented in table ES-3 do not include support facilities and are based on different operating concepts than those developed for the individual visitor transportation systems described later in this Executive Summary.

Because of the magnitude of the required investment, the impacts on natural resources of building large parking lots, the high operating and maintenance costs, and the disruption of existing visitor use patterns associated with a parkwide transportation system, this alternative was not carried forward into detailed analysis. A more cost-effective approach to reducing the negative impacts of visitor transportation would involve focusing investments in visitor transportation systems in those areas that have concentrated visitor use and sensitive and significant resources.

The following paragraphs discuss the development of VTS alternatives for each of the VTS service concepts not involving a parkwide system.

Entrance Station to Activity Area Shuttle. This service concept would be most applicable at entrance stations where visitors travel to and from the entrance station. It would be most appropriate as a voluntary system. The best opportunity for travel to and from a single station would occur at the north and west entrance stations. The presence of nearby lodging facilities, which act in part as overflow capacity for Yellowstone, the greater number of overnight rooms, the higher overall entrance volume (34% of all entries occur at the west entrance station and 14% of all entries occur at the north entrance station) and the convenient access to Old Faithful (which attracts 25,000 daily visitors) make the west entrance the most appropriate location for implementation of this VTS concept. Grant Village/West Thumb could provide a secondary staging area and route terminal for a transportation system from the west entrance to Old Faithful, potentially capturing some visitors entering Yellowstone from the south.

Grand Loop Segment Shuttle. Nine individual road segments comprise the Grand Loop Road. Several of the segments traverse important wildlife habitats and other environmentally sensitive areas. The character of the surrounding terrain varies widely, from alpine mountain slopes on Dunraven Pass to wooded streamside valleys on many other segments. Because of the heavy volume of traffic throughout the park and the resulting likelihood of delays on a bus-based transportation system, a system providing service along a portion of the Grand Loop Road would be most effective as a mandatory system. The following characteristics were considered desirable for a potential transportation system of this type:

- potential reduction in vehicular impacts on sensitive wildlife habitats
- potential to afford a special visitor experience, including views of wildlife and natural landscapes
- acceptable impacts on major park features by private vehicles
- ability to support park and visitor use management goals

Two Grand Loop road segments provide the best opportunities for VTS implementation:

- Lake/Fishing Bridge to Canyon (Hayden Valley)
- Canyon to Tower (Dunraven Pass)

The road segment through Hayden Valley traverses one of the most sensitive wildlife habitats in Yellowstone, with expansive meadows and river-edge environments. It also crosses major wildlife migration routes bounded by Yellowstone Lake and the Grand Canyon of the Yellowstone River. Having one of the highest traffic volumes of all road segments, the Hayden Valley portion of the

Grand Loop Road would offer substantial visitor experience and resource preservation benefits if closed to private vehicular travel.

The Dunraven Pass road segment has some of the worst road deterioration problems in Yellowstone. It is unique among the park's road segments because of its high mountain setting and expansive views. Dunraven Pass road may not be cost-effective to reconstruct because of its low traffic volumes. Closing the road to private vehicles and providing a fixed-guideway transit line (most likely a cog railway) would provide a potentially viable option to the possible closure of this segment to visitor access or costly reconstruction of the road to bring it up to a reasonable standard of safety and ride quality.

Activity Area Circulator Systems. Two of the park's activity areas may offer viable opportunities for relatively short circulator systems affording access to scattered viewing and activity areas. The three most-visited activity areas are Old Faithful, Canyon, and Grant Village/West Thumb. Of these, the Canyon area is best suited for a visitor transportation system, considering the locations of and distances between the viewpoints along both the north and south rims of the Grand Canyon of the Yellowstone. A service similar to that provided along the west rim of Grand Canyon National Park could be implemented at Canyon.

Old Faithful, with 25,000 daily visitors and a number of secondary thermal features, offers another viable area for circulator service. A visitor transportation system which would provide access to the Midway Geyser Basin and other features north of Old Faithful could help to smooth traffic flows over time and reduce parking capacity problems at the smaller features.

Visitor uses and travel patterns at Grant Village/West Thumb, the third most visited area of Yellowstone, are not well-suited for a visitor transportation system.

Viewpoints at the Grand Canyon of the Yellowstone could be served conveniently by a visitor transportation system.

FINAL TRANSPORTATION ALTERNATIVES

The final alternatives developed for detailed assessment are described below. The Candidate Areas for Transit Service map on the following page illustrates the location of each alternative within the park. Individual maps and charts at the end of the "Executive Summary" present the specific routes and essential service requirements for each option.

West Yellowstone to Grant Village (via Old Faithful)

One VTS alternative was developed for this area. A voluntary shuttle bus system would link West Yellowstone and Grant Village. The system would serve the Old Faithful area plus other popular geyser basins and trailheads along the route. The service frequency would be 15 minutes during the peak period and 30 minutes during the off-peak periods. Stops would include access points along the Madison River, Madison Junction, Fountain Paint Pots, Midway Geyser Basin, Biscuit Basin, Black Sand Basin, Old Faithful, Kepler Cascades, Delacy Creek, and West Thumb. Visitor

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parking would be provided in West Yellowstone and at Grant Village. Approximately 200 vehicle spaces would be needed to serve the projected demand at each end of the route. An existing surplus of 78 spaces at the Grant Village visitor center could reduce the parking requirement to 122 spaces at that location. A number of staging area options exist for West Yellowstone. A representative site near the airport (northwest of town) was considered for this alternative.

The chart accompanying the map for this alternative presents an overview of the service that could be provided and the equipment requirements for the shuttle bus system.

Hayden Valley (Lake to Canyon)

Four VTS alternatives were developed for this area. The alternatives are identical in route length, number of stops, and the location and size of auxiliary parking areas. The difference between the alternatives is in the type of transit technology that would be used.

The alternatives included:

- shuttle using conventional bus
- shuttle using articulated bus
- elevated monorail or other group rapid transit (GRT) technology
- self-propelled rail transit

Under all of these alternatives, the roadway would be closed to private vehicular traffic, and transit usage would become mandatory. This action would result in a 90% decrease in daily traffic through the Hayden Valley. Both the elevated monorail and self-propelled rail transit alternatives would require new guideways. A service road for maintenance, law enforcement, and emergency vehicles would be needed near this system. The monorail GRT option would require an electrical power supply along its guideway.

Staging areas would be located at both Canyon and Lake Village for this service. A total of 683 auto and recreational vehicle (RV) parking spaces would be required at Canyon to accommodate the projected demand. By using an existing surplus of 124 spaces, only 559 new parking spaces would be required. These parking requirements reflect the demand associated with a Hayden Valley transit service only. Parking for a possible Canyon area circulator is included under a separate alternative.

A self-propelled rail system could reduce impacts on the wilderness character of Yellowstone.

The Lake Village staging area would require about 893 auto and RV spaces. A larger number of spaces would be needed here because visitors would be expected to spend more time in the Canyon area as part of their round-trip.

The map and chart at the end of the "Executive Summary" provide an overview of the equipment and facilities that would be required for each of the transit alternatives for Hayden Valley.

Dunraven Pass (Canyon to Tower)

Two alternative VTS technologies were identified for this segment:

- shuttle using conventional or large buses
- cog railway

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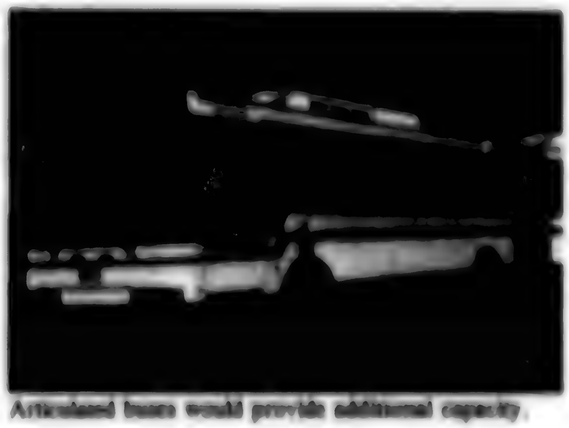
Conventional bus transit could serve visitor needs.

Both systems would operate between the Canyon Village area and the Tower-Roosevelt area with interim stops at Mt. Washburn Road and Tower Fall. Visitors to Mt. Washburn would hike from a stop on the VTS route.

Either transit technology would permit access to other trailheads along the Dunraven Pass road segment. The roadway would be closed to visitor traffic, and transit use would be mandatory in both cases. The cog railway alignment could be constructed on or adjacent to the existing roadway alignment. A narrower road could be retained for service vehicles, or utility vehicles could be operated on the cog railway.

Staging areas would be located at both Canyon and Tower to support service on the Dunraven Pass segment. Passengers originating at Tower would probably spend more time on their round trip because of the many activities available at Canyon. A total of 612 auto and recreational vehicle spaces would be needed to serve the estimated demand at Tower, and 476 spaces would be needed at Canyon. Using the existing surplus of 124 spaces at Canyon would result in a requirement for 352 new spaces. A common staging area and maintenance facility could be shared at Canyon if the Hayden Valley and Canyon area transportation systems also were implemented.



Articulated buses would provide additional capacity.

The map and chart at the end of the "Executive Summary" summarizes the key aspects of the Dunraven Pass alternatives.

Grand Canyon of the Yellowstone Area

Three alternatives were identified for this area. The north rim shuttle bus alternative would involve closing North Rim Drive from the camper services facility to the intersection with the Grand Loop Road near Lower Falls view. Private vehicle access to the overlook and trailhead parking areas would be eliminated and visitors would be shuttled to each vantage point from a parking lot located in the Canyon Village area.

A combination of 124 surplus spaces and 559 new parking spaces would provide the necessary total of 683 vehicle spaces for automobiles and RVs in Canyon Village. The north rim VTS alternative could also share a staging area and maintenance facility with the south rim, Hayden Valley, or Dunraven Pass systems.

Shuttle buses would transport passengers from the Canyon Village staging area to Inspiration Point, Grandview, Lookout Point, and the Brink of Lower Falls along North Rim Drive. Passengers would depart and board the buses in the areas where private vehicle parking is

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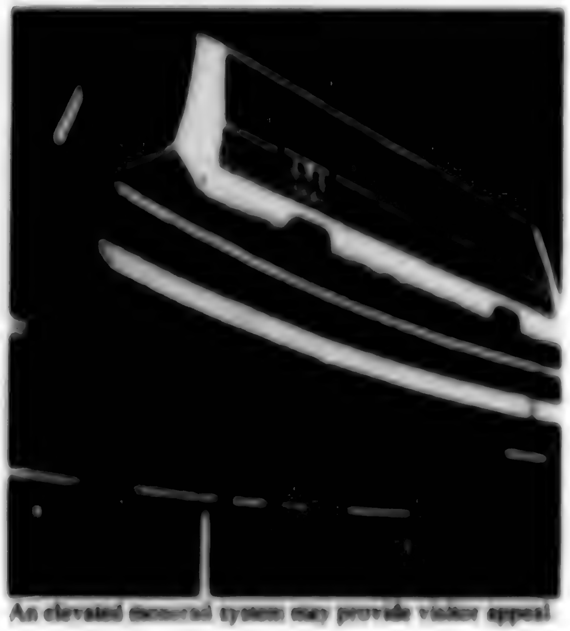
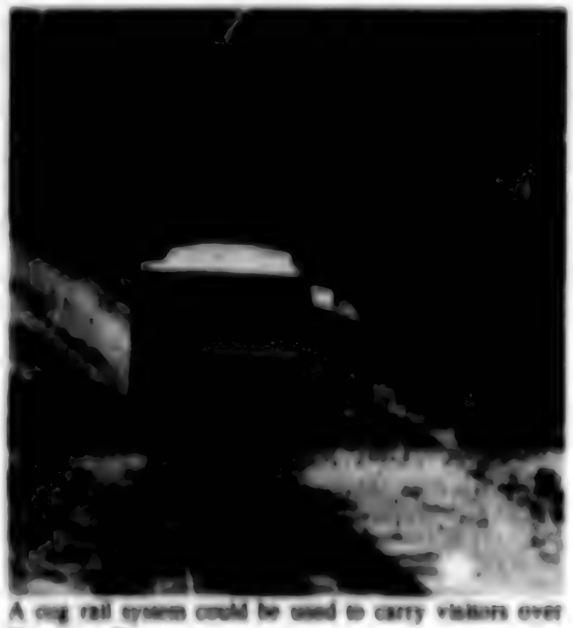


An elevated monorail system may provide visitor appeal.



A cog rail system could be used to carry visitors over Dunraven Pass.

currently offered. Buses would operate at frequent intervals to allow visitors to walk to different locations or re-board after sightseeing. Shuttle stops would also provide a link with the Canyon hiking trail system.

Alternatives 2 and 3 would provide service to the south rim. Alternative 2 would use shuttle buses while Alternative 3 would use an elevated monorail GRT system. For the bus alternative, the service would start at the Upper Falls lot and proceed to the south drive via the Grand Loop Road. For the monorail system, service would operate between Wapiti Trailhead and Artist Point, with a stop at Uncle Tom's Trail. The south rim roadway would be closed to visitor traffic beyond Uncle Tom's Trail under both alternatives.

A total of 195 additional parking spaces at Upper Falls view, Wapiti Trailhead, and Uncle Tom's Trail would be required to support the bus alternative. The combined total of 260 existing spaces at the three lots would provide over half of the total estimated requirement of 455 spaces.

A total of 379 parking spaces would be needed to serve the estimated demand of a monorail alternative. Parking demand would be less for the monorail because of its shorter route and duration of stay. The 178 existing parking spaces at Wapiti Trailhead and Uncle Tom's Trail could be used, along with 201 new spaces. The south rim VTS alternatives could potentially share a maintenance facility and staging area with other transportation systems serving the Canyon area.

For the purposes of this study, north and south rim transportation systems were evaluated separately. These alternatives could also be combined.

The map and chart at the end of the "Executive Summary" summarize the Canyon area transit alternatives.

Old Faithful/Geyser Basin Area

Two circulator bus alternatives were identified and developed for this area. Alternative 1 would use conventional buses, and Alternative 2 would use articulated buses. The buses would leave from Old Faithful and travel to Firehole Lake Drive, with stops at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, Great Fountain Geyser/White Dome Geyser, Firehole Lake, and Fountain Paint Pots. These features currently have small parking areas. Visitors are frequently forced to pass them by or park along the narrow road edge when parking lots are at capacity. Using a staging area at Old Faithful, visitors could be shuttled to view these resources, reducing parking demand in these crowded areas.

Under this alternative, the existing road could be closed and obliterated/reclaimed north of Fountain Paint Pots. Traffic could be rerouted to the west on Fountain Freight Road. Visitor traffic could be restricted from using the old road north of Midway Geyser Basin and on Firehole Lake Drive. Private vehicle parking could be eliminated at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, and Fountain Paint Pots Trail.

Unused parking spaces at the Old Faithful development could be used for a transit staging area. A surplus of 141 spaces was identified in the west lot at Old Faithful. An additional 734 spaces would provide the required total of 875 auto and RV spaces required for the visitor transportaion system serving the Geyser Basin area.

The fleet and facility requirements for the bus technologies are provided on the chart accompanying the map of the Old Faithful/Geyser Area transit route at the end of the "Executive Summary".

EVALUATION SUMMARY

The evaluation charts at the end of the "Executive Summary" provide a comparison of the Yellowstone VTS alternatives in six evaluation categories. The following paragraphs highlight the most important results of the evaluation process. Tables summarizing the costs of each alternative are also provided. The cost estimates for bus-based VTS alternatives do not reflect roadway rehabilitation or increased roadway maintenance, which may be required to support the transit service. The fixed guideway alternatives may also have additional costs associated with retaining or removing existing roadways.

West Yellowstone to Grant Village (via Old Faithful)

This alternative would attract relatively few riders; however, it would encourage the development and use of visitor support facilities outside the park, including potential investments being considered by TWRS. Of the possible remote staging and shuttle options in Yellowstone, this alternative would have the best chance of success, due to the concentration of lodging units near the west entrance station and in Grant Village and the connection the system would provide to Yellowstone's most visited feature — Old Faithful. The west entrance to Yellowstone has the highest percentage of existing vehicles which had entered at the same location - 38% in a 1993 survey. A reduction in the number of personal vehicles through the Madison River corridor could help reduce the potential for wildlife disruption and the degree of roadside

Table ES-4: Cost Summary for West Yellowstone to Grant Village

Cost Element	Motor Coach Shuttle Bus
Construction and Equipment (millions)	$6.8
Annual Operating and Maintenance (millions)	$2.0
Annual Passengers	217,700
Annualized Cost Per Rider	$12.15

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

habitat deterioration. The cost for the West Yellowstone shuttle bus alternative is presented in table ES-4. In addition to the costs shown in the table, housing costs for VTS employees would total $0.9 million.

Hayden Valley (Lake to Canyon)

Development of a visitor transportation system in Hayden Valley could reduce vehicular impacts on wildlife and fragile habitat in an especially sensitive area of Yellowstone. Such a system could provide visitors a unique and pleasant way to experience wildlife in a natural setting. A monorail system would isolate visitors from the environment, minimizing the impact of visitor use on the resources of the Hayden Valley. The monorail also would offer visitors a unique and exciting viewing perspective. Although a large structure would be placed in the landscape, the majority of visitor viewing would be from the vehicles, minimizing the actual visual impact of the system. The monorail alternative would cost substantially more than the other Hayden Valley VTS alternatives and might require an upgrade of the park's electrical transmission system. Costs for each alternative are summarized in table ES-5. Housing costs for VTS employees would total $1.3 million to $3.3 million.

Dunraven Pass (Canyon to Tower)

This segment of the Grand Loop Road has relatively low visitation. The condition of the road is poor and maintenance is difficult. The development of a cog railway system along the current road alignment would address some of the existing maintenance concerns. The visitor appeal of such a system could increase visitation and improve the cost-effectiveness of the cog railway option.

Bus service along this road segment would require road improvements and continued maintenance. The ridership potential of the bus options is probably lower than that for the cog railway, potentially affecting the cost-effectiveness of these alternatives. Development of either type of transportation system along this segment would help to reduce traffic volume and associated disturbance to wildlife and roadside habitat. Table ES-6 summarizes the costs for each of the three Dunraven Pass transit options. A total of $1.6 million to $2.5 million in housing costs for VTS employees would be associated with the alternatives analyzed for Dunraven Pass.

Canyon Area Shuttles

Visitor transportation systems in this compact activity area would cost less than in other locations because VTS routes would be short. The primary benefit of systems in the Canyon area would be removing traffic and parking from the scenic areas along the rims. Access to viewpoints would be easier because visitors would not have to search for parking spots at individual viewpoints. VTS service would permit visitors to take short walks between viewpoints and would offer a different type of experience from the typical Yellowstone private vehicle tour. The monorail option would reduce noise and VTS emissions, but could disrupt views of and from the rims.

The cost of the Canyon area VTS alternatives are presented in table ES-7. Housing costs for Canyon VTS employees would range from $0.2 million to $0.6 million.

Old Faithful/Geyser Basin Shuttle

This alternative could reduce the peaks in visitor traffic which occur after Old Faithful eruptions. Congestion in the Old Faithful area, on the Grand Loop Road, and at the thermal features near Old Faithful could be reduced by offering a service that would encourage visitors to stay longer. The parking demand at the various thermal features along the roads north of Old Faithful would be reduced. The access to the thermal features would be more difficult for through travelers with a limited amount of time to view the park if all parking were eliminated at each thermal area. Table ES-8 summarizes the costs for the two bus types evaluated for this service. VTS employee housing would cost between $1.0 million an $1.2 million.

IMPLEMENTATION

With costs ranging from $1.26 to more than $75.00 per passenger, the VTS alternatives identified for Yellowstone would need to be

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Table ES-5: Cost Summary for Hayden Valley Alternatives

Cost Element	Conventional Shuttle Bus	Large Shuttle Bus	At Grade Self-Propelled Rail	Elevated Monorail
Construction and Equipment (millions)	$31.1	$34.3	$348.6	$880.7
Annual Operating and Maintenance (millions)	$5.1	$3.6	$8.6	$5.7
Annual Passengers	1,021,200	1,021,200	1,021,200	1,021,200
Annualized Cost Per Rider	$7.98	$6.80	$36.79	$75.78

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Table ES-6: Cost Summary for Dunraven Pass Alternatives

Cost Element	Conventional Shuttle Bus	Large Shuttle Bus	Cog Railway
Construction and Equipment (millions)	$23.1	$29.7	$362.0
Annual Operating and Maintenance (millions)	$3.8	$3.2	$6.9
Annual Passengers	657,700	657,700	657,700
Annualized Cost Per Rider	$9.14	$9.24	$55.87

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

supported by a new dedicated funding source. Potential sources include funding provided in Intermodal Surface Transportation Efficiency Act; line-item appropriations as part of the NPS budget; participation by the park concessioner; and user charges, which would be most effective if collected as part of the entrance fee. The systems would attract the most ridership if fares were not charged; as a result, direct user charges are not recommended. Private sector participation would depend on the potential for the investment to be recovered through direct or indirect user charges or increased revenues from the sale of other goods and services. Public sector investment in VTS alternatives for Yellowstone could be considered as part of a larger strategy to preserve important park resources.

Despite the obstacles, visitor transportation systems might be a viable means to achieve many desirable objectives in the management of visitation to and within Yellowstone. These systems could shift the emphasis from

Table ES-7: Cost Summary for Canyon Area Alternatives

Cost Element	North Rim Conventional Shuttle Bus	South Rim Conventional Shuttle Bus	South Rim Elevated Monorail
Construction and Equipment (millions)	$6.5	$4.9	$93.4
Annual Operating and Maintenance (millions)	$0.8	$0.6	$0.4
Annual Passengers	1,105,700	737,100	737,100
Annualized Cost Per Rider	$1.26	$1.49	$10.95

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Table ES-8: Cost Summary for Old Faithful to Geyser Basin Alternatives

Cost Element	Conventional Shuttle Bus	Articulated Shuttle Bus
Construction and Equipment (millions)	$12.2	$16.1
Annual Operating and Maintenance (millions)	$2.6	$2.3
Annual Passengers	850,500	850,500
Annualized Cost Per Rider	$4.39	$4.48

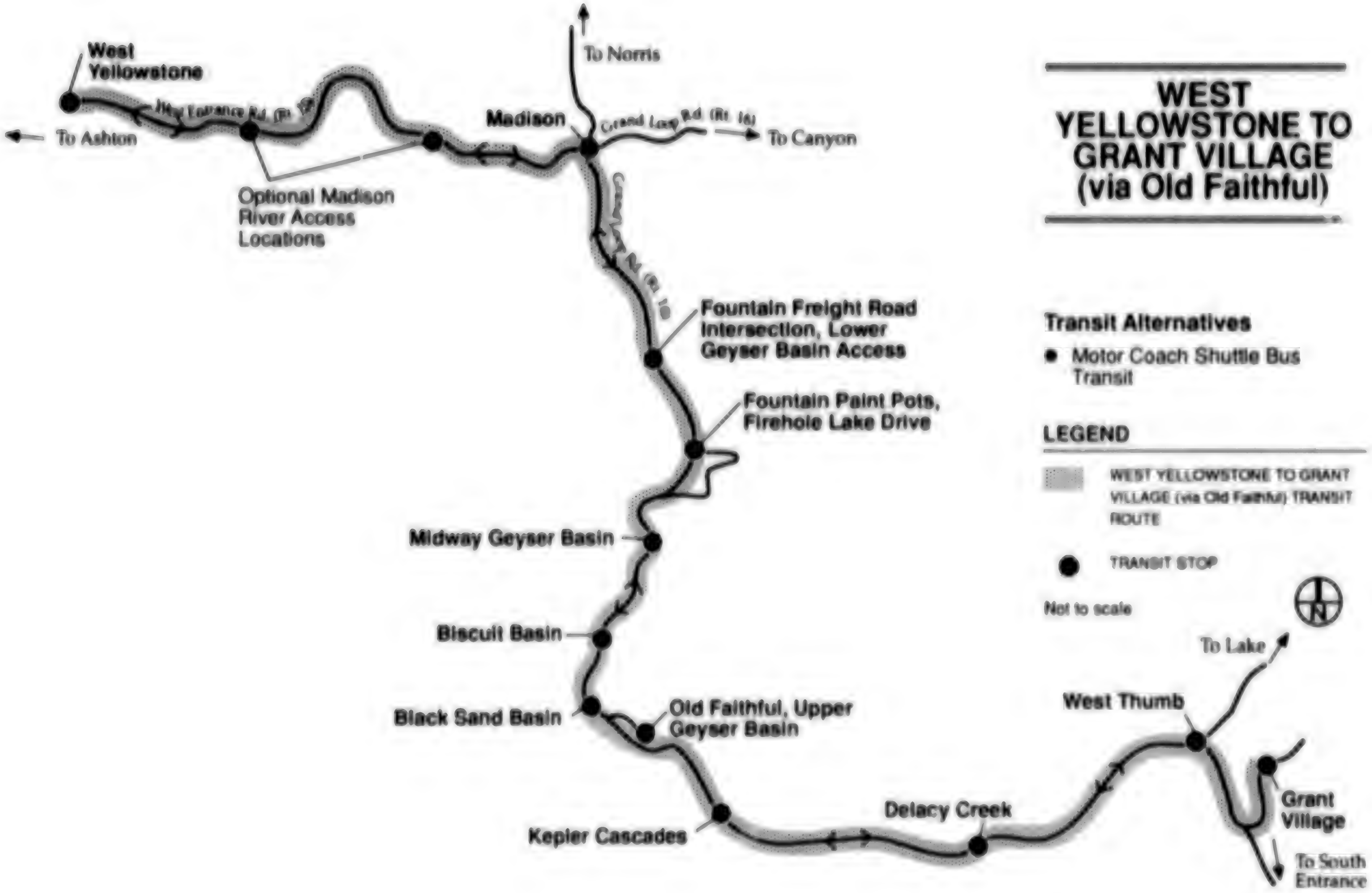
Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

providing facilities and services for private vehicle use to focusing more on the needs of people. The practice of modernizing and widening the roads and enlarging parking lots for more traffic should be carefully considered. Public transportation could deliver visitors to in-park locations in more predictable numbers based on the carrying capacity of the park resources and could provide in-vehicle interpretation. More control could be exercised over human/animal interactions, at least in the most sensitive habitat areas of the park. Unique and fragile geothermal, archaeological, and historic resources could be better protected.

Improved safety and less need for law enforcement and traffic management work by park staff would be likely outcomes of reduced reliance on private vehicles for visitor transport.

The development of VTS alternatives in portions of Yellowstone would also provide the potential for a broader range of visitor experiences. At present, nearly all visitor exposure to the park involves private vehicle trips and short walking excursions through developed areas. Vehicle travel is frequently under congested conditions in long lines of cars and RV's. VTS services could offer a distinctly different type of experience, if significant reductions in private vehicular trips could be achieved.



WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful)

Transit Alternatives

- ● Motor Coach Shuttle Bus Transit

LEGEND

▨ WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful) TRANSIT ROUTE

● TRANSIT STOP

Not to scale

YELLOWSTONE
NATIONAL PARK
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
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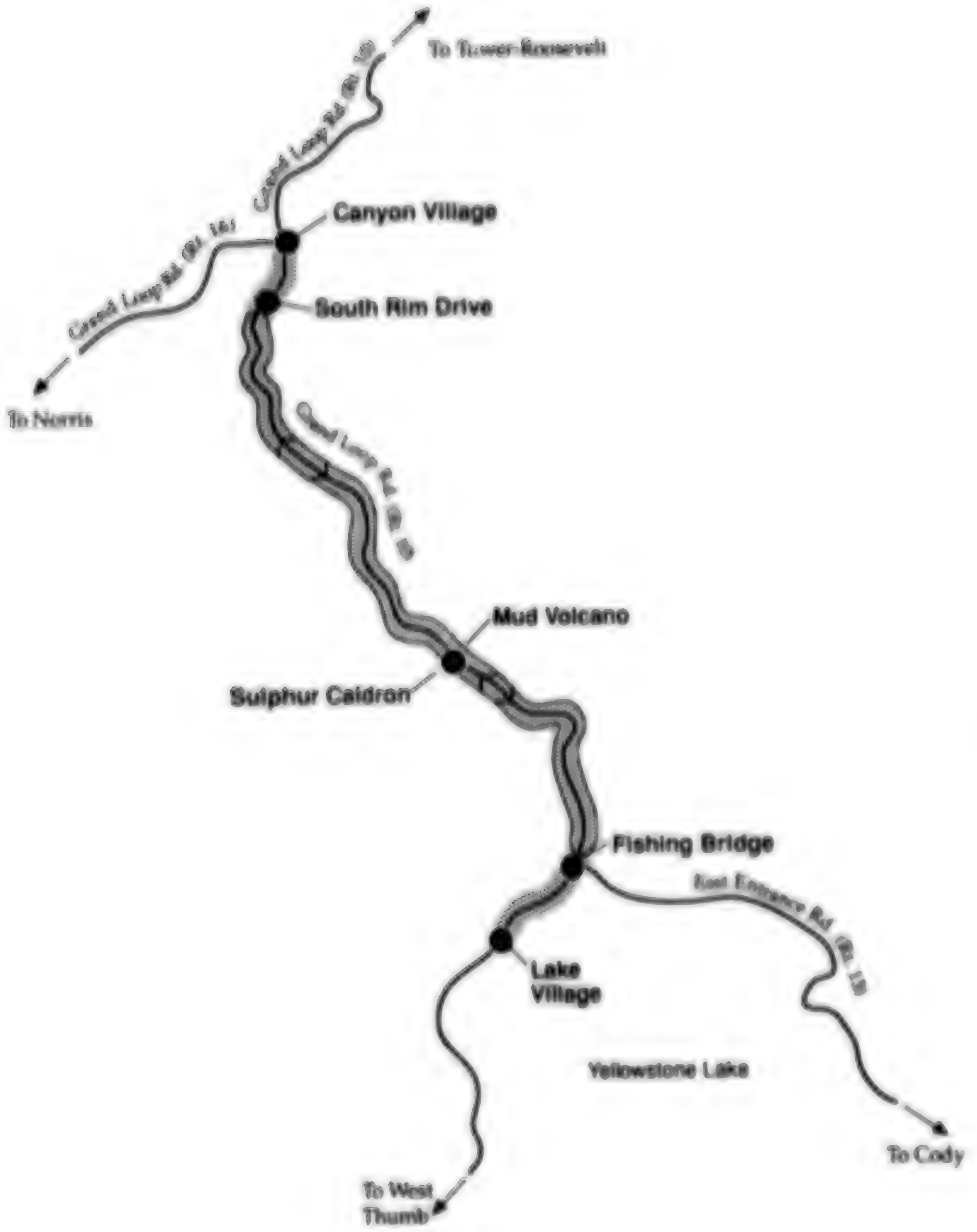
West Yellowstone to Grant Village (via Old Faithful)
VTS Alternative Definition

	Motor Coach Shuttle Bus Transit Alternative	
Shuttle Round Trip Route Length (miles)	109.0	
Shuttle Daily Access and Egress Boarding Capacity*	3,840	
Shuttle Fleet Size	20	
Shuttle Daily Vehicle Round Trips	40	
	Auto & RV	**Bus**
West Yellowstone Staging Area Total Parking Spaces Required	200	0
Existing Surplus Spaces Available	0	0
Net Parking Spaces Required	200	0
Grant Village Staging Area Total Parking Spaces Required	200	0
Existing Surplus Spaces Available (Grant Village Visitor Center)	78	0
Net Parking Spaces Required	122	0

* Assumes two boardings per visitor. Additional linked trips may occur.



HAYDEN VALLEY SEGMENT

Transit Alternatives

- Conventional or Large Shuttle Bus Transit
- Elevated Monorail Group Rapid Transit
- At-Grade Self-Propelled Rail Transit

LEGEND

▨ HAYDEN VALLEY TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

Not to Scale

YELLOWSTONE
NATIONAL PARK
ALTERNATIVE TRANSPORTATION
MODES FEASIBILITY
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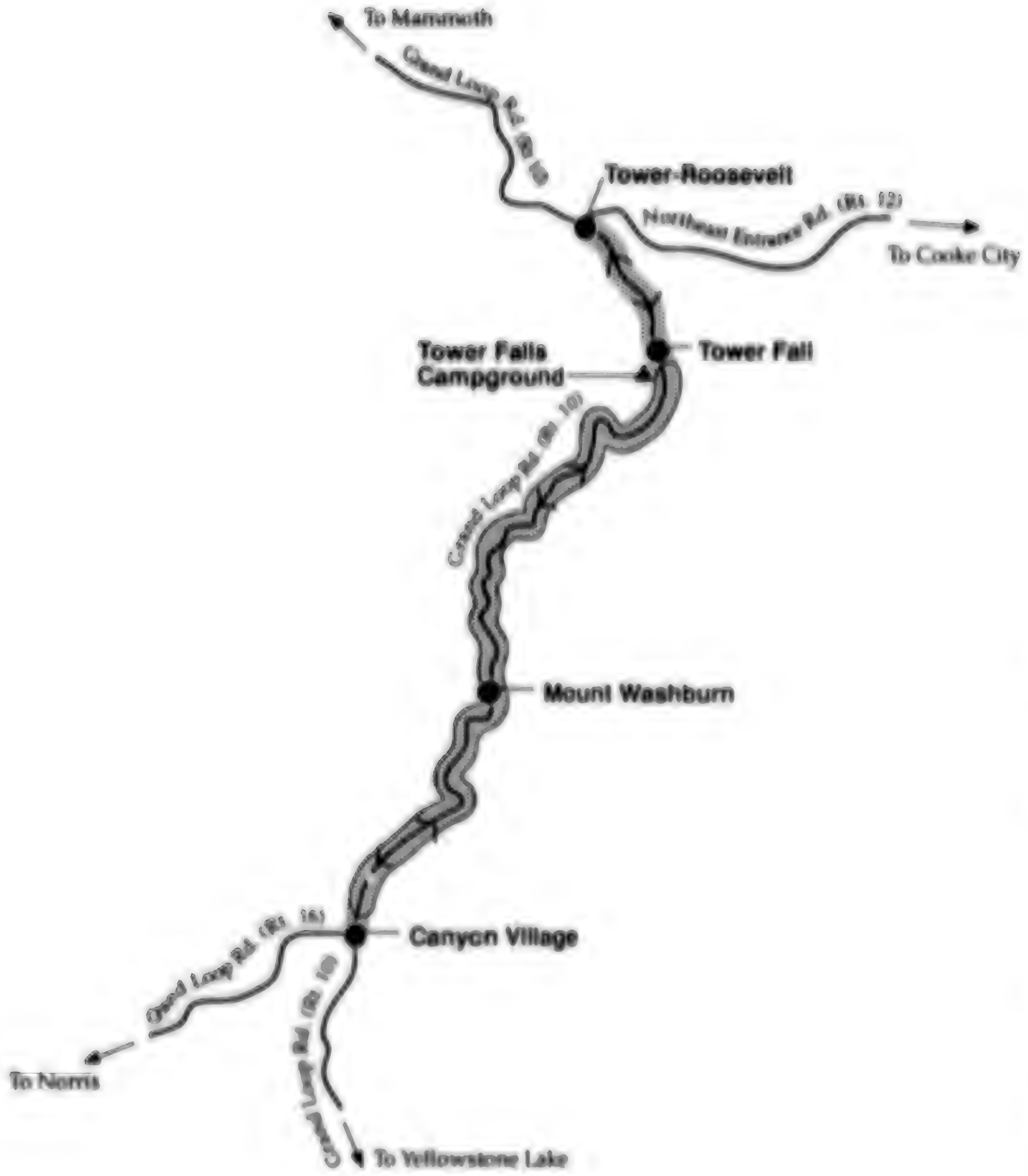
Hayden Valley (between Lake Village and Canyon) VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Articulated Shuttle Bus Transit Alternative		At-Grade Self-Propelled Rail Transit Alternative		Elevated Monorail Transit Alternative	
Shuttle Round Trip Route Length (miles)	34.5		34.5		34.5		34.5	
Shuttle Daily Access and Egress Boardings*	18,010		18,010		18,010		18,010	
Shuttle Fleet Size	80		54		44		30	
Shuttle Daily Vehicle Round Trips	300		200		160		106	
Canyon Staging Area Total Parking Spaces Required	Auto & RV 683	Bus 3	Auto & RV 683	Bus 3	Auto & RV 683	Bus 3	Auto & RV 683	Bus 3
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	124	0	124	0	124	0
Net Parking Spaces Required	559	3	559	3	559	3	559	3
Lake Staging Area Total Parking Spaces Required	893	4	893	4	893	4	893	4
Existing Surplus Spaces Available	0	0	0	0	0	0	0	0
Net Parking Spaces Required	893	4	893	4	893	4	893	4

* Assumes two boardings per visitor. Additional linked trips may occur.

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.



DUNRAVEN PASS SEGMENT

Transit Alternatives

- Conventional or Large Shuttle Bus Transit
- Cog Rail Transit

LEGEND

▨ DUNRAVEN PASS TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

Not to Scale

YELLOWSTONE
NATIONAL PARK
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
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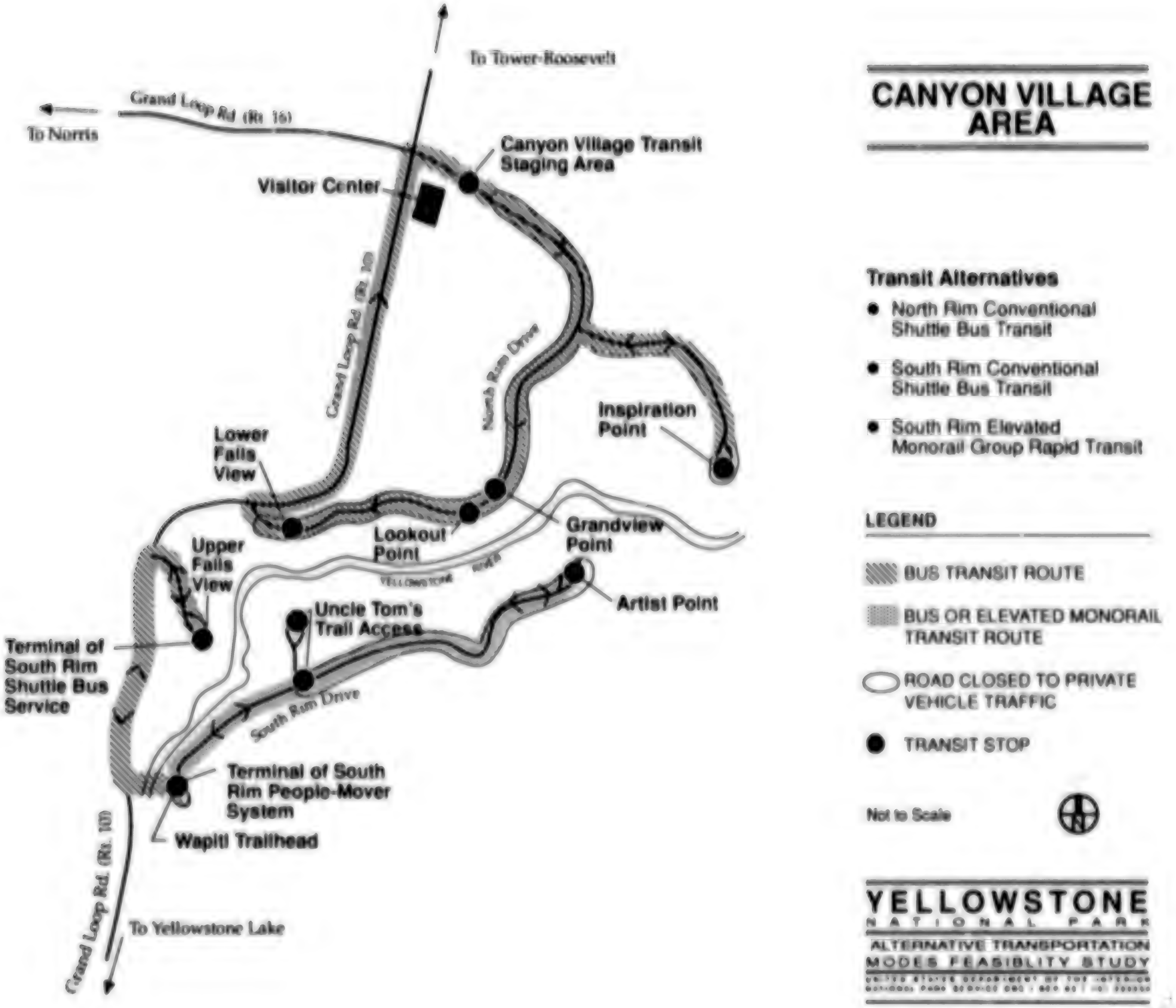
Dunraven Pass (between Canyon and Tower) VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Large Shuttle Bus Transit Alternative		Cog Rail Transit Alternative	
Shuttle Round Trip Route Length (miles)	38.0		38.0		38.0	
Shuttle Daily Access and Egress Boardings*	11,600		11,600		11,600	
Shuttle Fleet Size	60		48		32	
Shuttle Daily Vehicle Round Trips	200		160		106	
	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus
Canyon Staging Area Total Parking Spaces Required	476	2	476	2	476	2
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	124	0	124	0
Net Parking Spaces Required	352	2	352	2	352	2
Tower Staging Area Total Parking Spaces Required	612	2	612	2	612	2
Existing Surplus Spaces Available	0	0	0	0	0	0
Net Parking Spaces Required	612	2	612	2	612	2

* Assumes two boardings per visitor. Additional linked trips may occur.

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.



CANYON VILLAGE AREA

To Tower-Roosevelt
Grand Loop Rd. (Rt. 16)
To Norris
Canyon Village Transit Staging Area
Visitor Center
Grand Loop Rd. (Rt. 10)
North Rim Drive
Inspiration Point
Lower Falls View
Lookout Point
Grandview Point
Yellowstone River
Upper Falls View
Artist Point
Uncle Tom's Trail Access
Terminal of South Rim Shuttle Bus Service
South Rim Drive
Terminal of South Rim People-Mover System
Wapiti Trailhead
Grand Loop Rd. (Rt. 10)
To Yellowstone Lake
Transit Alternatives
North Rim Conventional Shuttle Bus Transit
South Rim Conventional Shuttle Bus Transit
South Rim Elevated Monorail Group Rapid Transit
LEGEND
BUS TRANSIT ROUTE
BUS OR ELEVATED MONORAIL TRANSIT ROUTE
ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC
TRANSIT STOP
Not to Scale
N
YELLOWSTONE NATIONAL PARK
ALTERNATIVE TRANSPORTATION MODES FEASIBLITY STUDY

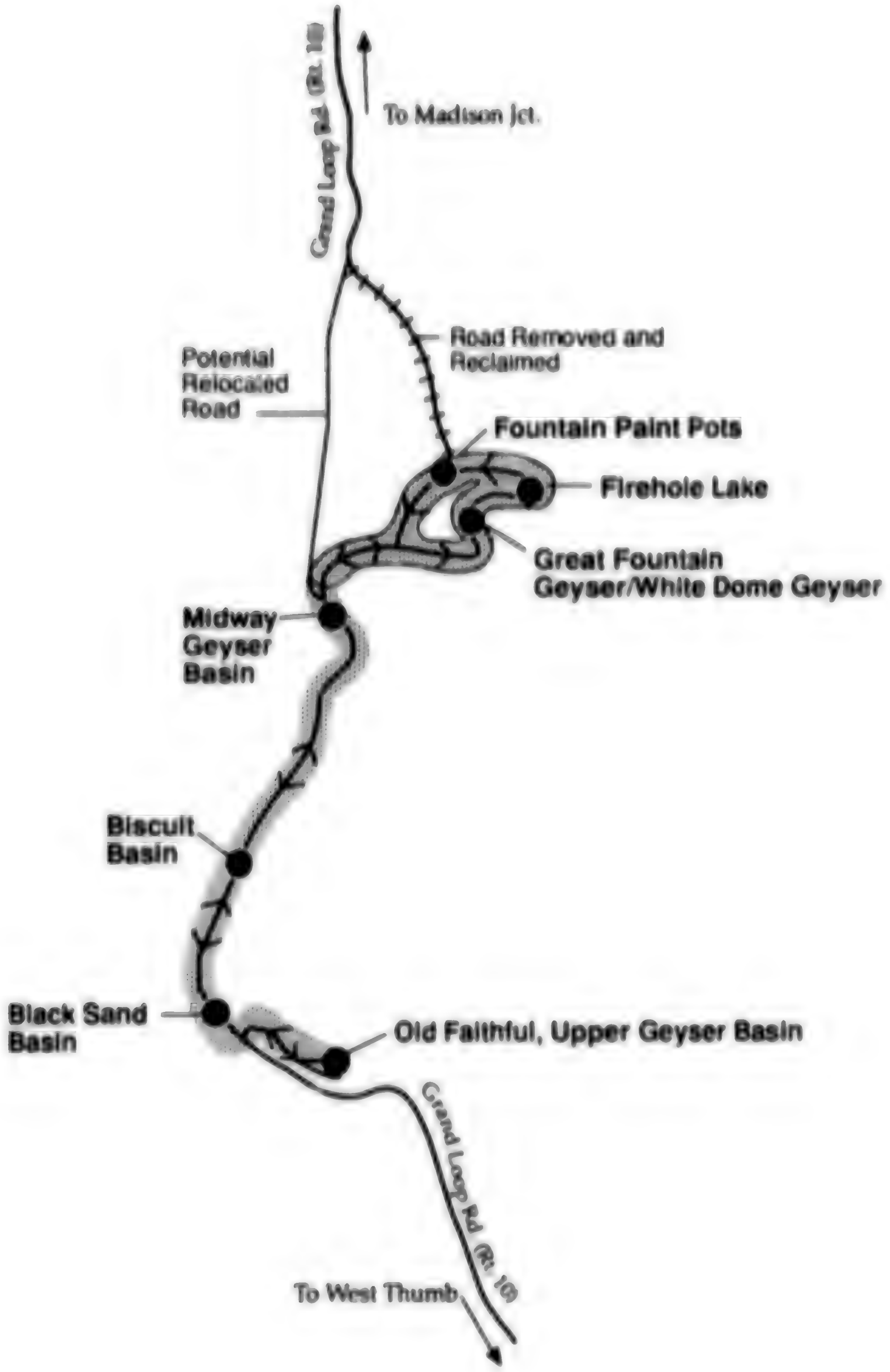
Canyon Village Area VTS Alternatives Definition

	North Rim Conventional Shuttle Bus Transit Alternative		**South Rim Conventional Shuttle Bus Transit Alternative**		**South Rim Elevated Monorail Group Rapid Transit Alternative**	
Shuttle Round Trip Route Length (miles)	5.20		6.37		3.12	
Shuttle Daily Access and Egress Boardings*	19,500		13,000		13,000	
Shuttle Fleet Size	14		11		4	
Shuttle Daily Vehicle Round Trips	300		200		92	
North Rim Staging Area Total Parking Spaces Required	**Auto & RV** 683	**Bus** 3	NA		NA	
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	NA		NA	
Net Parking Spaces Required	559	3	NA		NA	
South Rim Staging Area Total Parking Spaces Required	NA		**Auto & RV** 455	**Bus** 2	**Auto & RV** 379	**Bus** 2
Existing Parking Supplies Available (Upper Falls View, Wapiti Trailhead, Uncle Tom's Trail)	NA		260	0	178	0
Net Parking Spaces Required	NA		195	2	201	2

NA=Not Applicable

*** Assumes two boardings per visitor. Additional linked trips may occur.**

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.



OLD FAITHFUL/ GEYSER BASIN AREA

Transit Alternatives

- Conventional or Articulated Shuttle Bus Transit

LEGEND

▨ OLD FAITHFUL/GEYSER BASIN TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

Not to Scale

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ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC · SEP [illegible]

Old Faithful/Geyser Basin VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Articulated Shuttle Bus Transit Alternative	
Shuttle Round Trip Route Length (miles)	21.5		21.5	
Shuttle Daily Access and Egress Boardings*	15,000		15,000	
Shuttle Fleet Size	30		25	
Shuttle Daily Vehicle Round Trips	240		200	
Old Faithful Staging Area	**Auto & RV**	**Bus**	**Auto & RV**	**Bus**
Total Parking Spaces Required	875	3	875	3
Existing Surplus Spaces Available (Old Faithful West Lot)	141	0	141	0
Net Parking Spaces Required	734	3	734	3

*** Assumes two boardings per visitor. Additional linked trips may occur.**

EVALUATION SUMMARY CHART

West Yellowstone to Grant Village (via Old Faithful) VTS Alternative

	Voluntary Shuttle Bus
Visitor Transportation and Management	• Encourages use of lodging and visitor facilities outside park • Encourages reduction in private vehicle use • Not convenient for through travelers • Could encourage more visitation to Old Faithful by providing additional access from West Yellowstone • Could reduce traffic peaks after Old Faithful eruptions • May encourage new use patterns • Ridership is likely to be low
Visitor Experience	• Provides a means of visiting park without private vehicle • Lengthens stay for through travelers • Reduces Personal freedom to experience park • Gathers visitors into groups • Offers opportunity for narration/interpretation
Resource Impact	• Minor reduction in traffic and emissions • Potential to reduce traffic related disturbances to wildlife and roadside habitat • Offers opportunity to provide advance interpretation to reduce improper use of resources • Space requirements for parking and passenger loading facilities = 2.3 acres (West Yellowstone), 1.4 acres (Grant Village), 1,920 s.f. (Old Faithful) • Maintenance facility requirements = 21,966 square feet
Consistency With Park Service and Regional Planning Goals	• Encourages commercial development in West Yellowstone • Encourages development of visitor support services outside park • Requires staging area in West Yellowstone
Cost and Cost Effectiveness	• Cost-effectiveness depends on ridership level • Private sector could provide West Yellowstone staging area
Implementation	• Coordination with private sector and West Yellowstone required • Relatively easy to implement • Concessioner could operate • Large number of vehicle suppliers • Number of transportation employees = 46

EVALUATION SUMMARY CHART
Hayden Valley VTS Alternatives

	Bus Alternative	Self-Propelled Rail Alternative	Elevated People-Mover Monorail Alternative
Visitor Transportation and Management	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens time of through trips between east and west entrances and north and east entrances • May increase traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens through trips between east and west entrances and north and east entrances • May increase private vehicular traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas • May require closure of access to area during construction	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens through trips between east and west entrances and north and east entrances • May increase private vehicular traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas • Difficult to operate in snow and ice • Vertical circulation required at stations • May require closure of access to area during construction
Visitor Experience	• Provides alternative means of viewing a segment of Grand Loop • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • Eliminates/reduces opportunity for close-range wildlife contact • Less personal freedom to experience park • Visitors gathered in groups • Buses produce noise and fumes	• Provides alternative means of viewing a segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • May provide visitor appeal • Could be consistent with wilderness character • Diesel engine produces noise and fumes • Visitors gathered in large groups • Eliminates/reduces opportunity for direct close-range wildlife contact • Less personal freedom to experience park	• Provides alternative means of viewing a segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • May provide visitor appeal • Offers unique viewing perspective • Could conflict with wilderness character • Could affect landscape views from points off guideway • Electrification system affects views along power line route • Very low noise level • Eliminates/reduces opportunity for close-range wildlife contact • No exhaust • Visitors gathered in large groups • Introduces urban element into landscape • Less personal freedom to experience park • On-demand stops are not possible
Resource Impact	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence in critical habitat area • Reduces road edge damage and social trails • Reduces vehicle travel and emissions • Some habitat loss at staging areas and maintenance base • Short-term wildlife disturbance during construction of staging areas • Conventional bus space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.3 acres (Canyon) • Large bus space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Conventional bus maintenance facility requirements = 2.0 acres • Large bus maintenance facility requirements = 1.5 acres	• Major reduction in vehicle/wildlife contacts • Reduces wildlife stress from human presence in critical habitat area • Eliminates road edge damage and reduces social trail formation • Changes historic use of Grand Loop Road segment • Reduces vehicle travel and emissions • Wildlife disturbance during construction of staging areas and alignment • Alignment could be affected by archeological sites, thermal features, and seismic activity • Construction material extraction and hauling impacts • Some habitat loss at staging areas, maintenance base and along route • Road could be removed/reclaimed • Space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Maintenance facility requirements = 7.8 acres	• Eliminates vehicle/wildlife conflicts • Reduces wildlife stress from human presence in critical habitat area • Eliminates road-edge damage and reduces social trail formation • Changes historic use of Grand Loop Road segment • Reduces vehicle travel, eliminates emissions • Wildlife disturbance during construction of staging areas and alignment • Alignment could be affected by archeological sites, thermal features, and seismic activity • Construction material extraction and hauling impacts • Road could be removed/reclaimed • Some habitat loss at staging areas, maintenance base and along route • Space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Maintenance facility requirements = 2.0 acres
Consistency With Park Service and Regional Planning Goals	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Novelty value could increase visitor use potential if road left in place • Construction materials extraction could affect areas outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment if road left in place	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Novelty value could increase visitor use potential • Electrification upgrades could affect areas inside and outside park • Construction materials extraction could affect areas inside and outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment if road left in place
Cost and Cost Effectiveness	• Least costly to implement • Highest operating costs	• High cost to implement • Moderate operating costs	• Most costly to implement • Lowest operating costs • Electrification upgrades could increase cost
Implementation	• Requires environmental documentation for staging areas and socioeconomic impacts • Relatively short time required to implement • Large number of potential suppliers • Number of transportation employees = 17 (conventional bus) • Number of transportation employees = 116 (large bus)	• Requires extensive environmental documentation for staging areas, alignment and socioeconomic impacts • Requires five years or more to plan, design and construct • Requires specialized expertise for design and construction • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 98	• Requires extensive environmental documentation for staging areas, alignment and socioeconomic impacts • Requires five years or more to plan, design and construct • Requires specialized expertise for design, construction, operations and maintenance • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 68

EVALUATION SUMMARY CHART

Dunraven Pass VTS Alternatives

	Bus Alternatives	Cog Railway Alternative
Visitor Transportation and Management	• Diverts traffic from low volume portion of Grand Loop Road • Lengthens trips from northeast entrance to all locations except Mammoth • May increase traffic between Tower and Mammoth, Mammoth and Norris and Norris and Canyon	• Diverts traffic from low volume portion of Grand Loop Road • Lengthens trips from northeast entrance to all locations except Mammoth • May increase traffic between Tower and Mammoth, Mammoth and Norris and Norris and Canyon • May require closure of access to area during construction
Visitor Experience	• Provides alternative means of viewing segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Eliminates/reduces opportunity for direct wildlife viewing • Less personal freedom to experience park • Visitors gathered in groups • Buses produce noise and fumes	• Provides alternative means of viewing segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Eliminates/reduces opportunity for direct wildlife viewing • Less personal freedom to experience park • Visitors gathered in large groups • Cog rail vehicles produce noise and fumes • May provide visitor appeal • Has wilderness character
Resource Impact	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence • Reduces road edge damage and social trails • Reduces vehicle travel and emissions • Some habitat loss at staging areas and along improved roadway • Short-term wildlife disruption during roadway upgrading and staging area construction • Conventional bus space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Large bus space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Conventional bus maintenance facility requirements = 1.5 acres • Large bus maintenance facility requirements = 1.5 acres	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence • Eliminates road edge damage and reduces social trails • Reduces vehicle travel and emissions • Road could be removed/reclaimed • Some habitat loss at staging areas and along railway • Construction material extraction and hauling impacts • Short-term wildlife disruption during railway and staging area construction • Space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Maintenance facility requirements = 1.9 acres • Unknown response of wildlife to crossing rails
Consistency With Park Service and Regional Planning Goals	• Could affect visitor use at east and northeast entrances • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel	• Could affect visitor use at east and northeast entrances • Material extraction could affect areas outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel if road left in place
Cost and Cost Effectiveness	• Requires repair and upgrade of road • Least costly to construct • Higher operating cost	• High construction cost for railway • Lower operating cost than buses
Implementation	• Requires environmental documentation for staging areas • Shorter time to implement • Large number of potential suppliers • Concessioner could operate • Road construction crew housing required • Number of transportation employees = 130 (conventional bus) • Number of transportation employees = 102 (large bus)	• Requires environmental documentation for staging areas and railway • Requires five years or more to plan, design and construct • Requires specialized expertise for design, construction, operation and maintenance • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 82

EVALUATION SUMMARY CHART

Canyon Area VTS Alternatives

	North Rim Shuttle Bus	South Rim Shuttle Bus	South Rim People - Mover
Visitor Transportation and Management	• Eliminates private vehicle traffic on north rim drive • Concentrates visitor parking at Canyon Village • Could increase congestion in Canyon Village area • Spreads visitor demand at north rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed	• Eliminates private vehicle traffic on south rim drive beyond Uncle Tom's Parking lot • Eliminates parking at Artist Point • Spreads visitor demand at South Rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed	• Eliminates private vehicle traffic on south rim drive beyond Uncle Tom's Parking lot • Eliminates parking at Artist Point • Spreads visitor demand at south rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed • Difficult to operate in snow • May require closure of access to area during construction
Visitor Experience	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Removes visual disruption of parking near rim • Buses could produce noise and fumes	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Removes visual disruption of parking near rim • Buses could produce noise and fumes	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into large groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Offers unique viewing perspective • May disrupt views from points away from guideway • Removes visual disruption of parking near rim • Electrification system affects views from points along power line route • May provide visitor appeal • Requires vertical circulation at stations • Introduces urban element into environment • No exhaust
Resource Impact	• Reduction in roadside impacts from social pull-offs • Reduces vehicle emissions • Space requirements for parking and passenger loading facilities = 6.3 acres • Maintenance facility requirements = 15,539 square feet	• Reduction in roadside impacts from social pull-offs • Reduces vehicle emissions • Space requirements for parking and passenger loading facilities = 2.3 acres • Maintenance facility requirements = 12,637 square feet	• Reduction in roadside impacts from social pull-offs • Eliminates vehicle emissions and noise along rim • Material extraction and hauling for construction • Temporary noise, emissions and disruption during construction • Areas of habitat impact along alignment • Isolates visitor activity from surrounding environment • Space requirements for parking and passenger loading facilities = 2.4 acres • Maintenance facility requirements = 11,778 square feet
Consistency With Park Service and Regional Planning Goals	• Reduces need for traffic patrols and resource protection along rim	• Reduces need for traffic patrols and resource protection along rim	• Reduces need for traffic patrols and resource protection along rim • Novelty value could increase visitation demand in Canyon area • Electrification upgrades could affect areas inside and outside of park
Cost and Cost Effectiveness	• Requires parking expansion at Canyon Village and purchase of vehicle fleet	• Requires parking area expansion and purchase of vehicle fleet	• Requires parking expansion and guideway construction • Most costly to implement
Implementation	• Requires environmental documentation for parking expansion • Multiple suppliers • Concessioner could operate • Relatively short implementation time • Number of transportation employees = 31	• Requires environmental documentation for parking expansion • Multiple suppliers • Concessioner could operate • Relatively short implementation time • Number of transportation employees = 27	• Requires environmental documentation for parking expansion and guideway • Limited number of suppliers • Requires specialized skills for design, construction, operation and maintenance • Five years or more required to plan, design and construct • Number of transportation employees = 12

EVALUATION SUMMARY CHART

Old Faithful/Geyser Basin VTS Alternatives

	Shuttle Bus Service
Visitor Transportation and Management	• Provides visitor access to Geyser Basin if Grand Loop relocated to Fountain Freight Road • Reduces traffic surge along Grand Loop Road after Old Faithful eruptions • Organizes visitor flows in geyser area
Visitor Experience	• Provides alternative visitor experience from auto touring • Eliminates need to search for parking at geyser viewing areas • May reduce crowding of visitors at use areas near Old Faithful • Less convenient for through travellers • Facilitates hiking between shuttle stops • Buses could produce localized fumes and noise
Resource Impact	• Reduces roadside damage and social trails from internal parking • Reduces auto travel in thermal areas • Allows removal and reclamation of a segment of road, and reclamation of wetlands • No overall reduction in vehicle travel or emissions • Conventional bus space requirements for parking and passenger loading facilities = 8.3 acres • Articulated bus space requirements for parking and passenger and loading facilities = 8.3 acres • Conventional bus maintenance facility requirements = 32,950 square feet • Articulated bus maintenance facility requirements = 33,481 square feet
Consistency With Park Service and Regional Planning Goals	• Road through thermal area must be maintained and/or upgraded to accommodate bus traffic • Eliminates portions of existing road and reclaims wetlands • Facilitates relocation of Grand Loop Road to Fountain Freight Road
Cost and Cost Effectiveness	• Cost-effectiveness depends on actual ridership response • Relatively low initial cost
Implementation	• May require environmental documentation if parking expansion needed at Old Faithful • Large number of suppliers • Concessioner could operate • Relatively short time to implement voluntary system • Mandatory system can not be implemented without relocation of Grand Loop Road • Number of transportation employees = 65 (conventional bus) • Number of transportation employees = 54 (articulated bus)

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PROBLEM STATEMENT

Yellowstone National Park is known around the world as a premier location for observing wildlife and unusual geologic and thermal features. Because of the size of the park, the quality of the surrounding forests and undeveloped land, the historic structures, widely known viewpoints, and nearby Rocky Mountain towns, the park is thought of as one of the last examples of the "untamed west." The park contains many natural resources, including geological phenomena, unique vegetation, and diverse wildlife. The quantity and quality of these natural resources are here largely because of protection afforded by park management and a relative lack of human and vehicle intrusions.

Yellowstone National Park is well known for its geologic features.

Millions of people visit and enjoy Yellowstone National Park each year. Some of the visitors have never been to the park before. Some are returning for the first time since their childhood and are now bringing their own families. Others use the park as they would their back yard, with frequent visits each year. The effect of this visitation has been debated by NPS professionals, environmental groups, and concerned citizens. The 1991 Vail Agenda report, *National Parks for the 21st Century*, points out that park use and enjoyment clearly result in impacts on certain park resources. Damage to natural backcountry resources of popular parks like Yellowstone has been well documented; however, the extent of the impacts on frontcountry resources is not well understood. The National Park Service "does not have a reliable knowledge base, and the extent of impacts caused by visitor use and enjoyment cannot be determined...," concludes the report. "Park managers and scientists do not fully understand the resiliency of park ecosystems as they respond to visitor use."

Increasing visitation also leads to crowding and a visitor experience which is inconsistent with visitor expectations. High volumes of traffic, parking lots full of private vehicles, and crowded conditions at viewpoints and features lend a busy urban character to the natural wilderness setting of the park.

Transportation in Yellowstone occurs along a system of roads known as the Grand Loop Road. The roads comprising the Grand Loop have two lanes and, in many segments, narrow or nonexistent shoulders and poor surface conditions. A 1988 evaluation rated 28.4% of the Yellowstone Road system in good or fairly good condition, with the remaining 71.6% rated fair to very poor.

The *Park-wide Road Improvement Plan*, completed in 1992, calls for a long-term program of road improvements, consisting of a combination of major reconstruction (MR) projects for severely deteriorated roadway segments and resurfacing, restoration, and rehabilitation (3R) projects to improve the condition and extend the life of other road segments in Yellowstone. For principal park roads that exhibit critical functional, structural, or capacity deficiencies, the long-range MR program has been prioritized and might be integrated with a 3R program to provide preventative short-term improvements. A total of 112 miles of 3R and 184 miles of MR improvements are included in the plan.

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Frequent wildlife sightings cause traffic backups.

The volume of visitor use and the associated traffic have increased to the point where traffic jams occur frequently. More than 2 million people visited the park during the months of June, July, and August in 1992. Visitation has risen by 33% over the last ten years. Frequent wildlife sightings cause traffic back-ups resulting in long delays, especially along the sections of the park roadway system that have narrow shoulders. Peak season traffic volumes on segments of roadway in the lower half of the Grand Loop Road averaged more than 7,000 vehicles per day according to the NPS 1992 traffic count program.

SERVICE TO YELLOWSTONE VISITORS

The Yellowstone road network and ancillary public facilities provide the following important functions, which contribute to the unique character of the park.

- They permit visitors to enter and exit the park through any one of five gateways, that provides unparalleled touring opportunities.
- They allow visitors to experience the park on their own terms, using their own vehicles, and stopping at any location.
- They permit visitors to stop as wildlife viewing opportunities arise, without regard to precise schedules.
- They allow visitors to view wildlife at close range and in a variety of settings.

ADMINISTRATIVE FUNCTIONS

Along with serving Yellowstone visitors, park roads fulfill the following administrative and access functions.

- access for NPS and concessioner employees working and/or living in Yellowstone
- delivery of supplies to ranger stations, inns, restaurants, and other concessions in a timely manner
- park maintenance access for waste pick-up and removal and facility maintenance
- access and circulation for park safety patrols

These functions could be more efficiently carried out if the congestion caused by visitor vehicles was reduced or eliminated.

LIMITATIONS OF EXISTING SYSTEMS

Visitor use has an undeniable impact on the Yellowstone roadway system. Increasing traffic volumes and vehicle weight have damaged road surfaces and accelerated erosion near roadways. Roadway alignments have been developed in valleys, along streams, in wildlife habitat areas, and -- in some instances -- in significant geothermal areas.

In broad terms, Yellowstone National Park faces the problem of an outdated and insufficiently maintained road network, which slows and often halts movement of vehicles

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and visitors through the park. However, enlarging the roadway system to accommodate more vehicles may not be compatible with the preservation of the park's unique resources and visitor crowding is now a problem at the most popular activity areas.

Capacity

Existing road widths in the park, with the exception of a few newly reconstructed segments, vary from 22 to 26 feet with minimal or nonexistent shoulders. RVs and tour buses up to 8 feet 6 inches wide, with side mirrors extending out another 18 inches on each side, are common throughout the park. The narrow widths, steep topography, sharp curves, and sheer drop-offs at the pavement edge create hazardous conditions. The capacity of parking lots near some of the attractions is exceeded during peak visitation periods, while lots elsewhere are underutilized.

Congestion

The interaction of people, vehicles, and animals results in congestion in the park. This congestion also affects the administrative functions of the Park Service and concessioners. Because there are few paved shoulders, bicycles must travel in general traffic lanes, which contributes to traffic backups. Large RVs often slow other traffic along the steep, narrow, winding roads. To compound the congestion during the peak season, "animal jams" often occur. Because of the abundance and proximity of wildlife, visitors are often compelled to stop their vehicles in the travel lane and leave them in pursuit of a better viewpoint. Long lines of traffic, delays, safety problems, and visitor frustration are the result.

Existing road widths vary from 22 to 26 feet with minimal or nonexistent shoulders.

All park visitors and employees — vacationers, Park Service and concession employees, delivery drivers, law enforcement personnel, tour bus drivers and passengers — face unpredictable and lengthy traffic delays. This situation is often experienced in Hayden Valley and to a lesser extent, at Firehole Canyon near Canyon Village, the Gibbon River Canyon, and the northeast entrance road. The occurrence of animal jams is unpredictable, which makes travel time unreliable and planning of a visitor transportation system difficult. Additionally, easy access to animals leads to disruptions in animal passages, harassment of the animals by visitors, and occasionally, visitor and animal injuries and deaths.

Visitation-Peak Season

Many of the park's most popular scenic areas are extremely crowded during the summer months. Yellowstone visitors, most of which are family groups, tend to cluster in a few developed areas that are easily accessible by private vehicle, notably at the international icon of Old Faithful. Other popular summer destinations are Canyon Village, Grant Village/West Thumb, Mammoth Hot Springs, Fishing Bridge, and Lake/Bridge Bay. More than 1/2 of all visitors stop at each of these locations. Wildlife and thermal area viewing, photography, pleasure walking, and museum visitation are all possible from along or beside the road.

Only a small percentage of visitors leave the roadways and the developed areas for hiking

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trips. An even smaller proportion (about 1%) use overnight backcountry sites. Among the reasons for the concentration of visitor use along the park roads are the size of the park, the desire to see as much as possible in a short time, and the age and type of visitors. About 50% of all park visitors are either under the age of 15 or over 55.

Peak season visitors gather to observe an Old Faithful eruption.

The numerous features near the Grand Loop are the most popular visitor destinations, resulting in high levels of pedestrian and vehicular congestion in certain areas. The concentration of visitors has resulted in significant damage to fragile thermal areas. For example, at White Dome Geyser on Firehole Lake Drive, vehicles parking in an unpaved parking lot have propelled gravel into the geyser. At Flood Geyser between Madison Junction and Old Faithful, a car was recently pulled out of a thermal area after breaking through a thin crust.

Visitation/Non-Peak Season

A recent transportation management issue has been the growth of nonpeak season travel to Yellowstone. Before the 1980s nearly all visitors came during the summer months. However, in recent years, visitation to Yellowstone has expanded beyond the summer season. The shoulder seasons — before and after the summer — have experienced a gradual increase in use over the past two decades. Additionally, there has been dramatic growth in winter use — a product of several factors, including the popularity of snowmobiling, the promotion of the park as a winter destination (by private interests), and the availability of reasonably priced rental snowmobiles in gateway communities. The number of winter visitors nearly doubled between 1982 and 1992. An increasing number of springtime visitors place additional burdens on roads and the park's wildlife, which is vulnerable due to exhaustion from the long, difficult winters. While the growth in non-peak visitation has been substantial, the absolute number of visitors in the winter and shoulder months is low, limiting the potential efficiency and feasibility of visitor transportation systems.

Regional Roadway Network

The roadway network of Yellowstone is part of a regional system that connects urban and rural areas in Montana, Wyoming, and Idaho. The park roads often provide the most direct route for travel between the communities. Only the road from the north entrance station (Gardiner) to the northeast entrance station (Cooke City) is kept open for auto traffic year-round. Snowmobiles and sno-cats provide the only means of roadway travel in most areas during the winter.

The park road system was not intended to accommodate through-traffic. The use of the Grand Loop Road by through-traffic is an outgrowth of the development of the surrounding regional roadway network. This use interferes with preservation of the park and its resources.

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SIGNIFICANT RESOURCES

Alternatives to the existing transportation and visitor access systems must support the preservation of significant natural resources within the park. The most significant resources and areas in Yellowstone include the following:

- unique thermal areas, including 60% of the worlds geysers, boiling springs, and fumaroles including the international icon Old Faithful
- more than two million acres of proposed wilderness preserve
- an abundant and diverse wildlife population, including grizzly bear, whooping crane, peregrine falcon, bald eagle, elk, bison, antelope, moose, black bear, mule deer, bighorn sheep, and other mammals, reptiles, and birds
- concentrated wildlife areas and migration patterns that result in wildlife interaction with park visitors
- bison migration between the Mirror and Central Plateaus through Hayden Valley and over a section of park road. (The Hayden Valley area is unique due to the natural barriers on either side created by Yellowstone Lake, the Grand Canyon of the Yellowstone, and Mt. Washburn, and adjacent elevations.)
- extensive riparian and wetland areas contributing to the high water quality and aquatic habitat of over 175 lakes such as Yellowstone, Shoshone, Lewis, and Clark; the Yellowstone, Snake, Lewis, Madison, Gibbon, Firehole, Gardner, and Lamar Rivers; and the headwaters of the Missouri and Columbia Rivers
- historic districts and structures throughout the park, specifically 553 eligible for listing on the National Register of Historic Places, 399 other historic structures, and the Grand Loop Road
- more than 400 archaeological sites known and a vast amount of unsurveyed land and unknown prehistory
- the scenic quality of the majority of the park
- major forest zones with stands of lodgepole pine, spruce/fir, and Douglas fir

IMPLEMENTATION CHALLENGES/ OPPORTUNITIES

Yellowstone traffic conditions have not deteriorated to a degree that people are deterred from visiting the park. The level of visitor satisfaction remains high in spite of the congestion, perhaps because congestion is a fact of urban life for many American and foreign visitors. In any event, the separation of visitors from their vehicles poses many difficult challenges in Yellowstone.

Decades of reliance on personal transportation have instilled Americans with a strong preference for, and attachment to, their vehicles. The typical length of stay in Yellowstone (one to three days), the through-park visitation pattern, the large numbers of visiting family groups, and the vast expanses of the park favor the use of personal transportation.

Despite the obstacles, visitor transportation systems, might be a viable means to achieve many desirable objectives in the management of visitation to and within the park. Visitor transportation systems could shift the emphasis from providing facilities and services for private vehicle use to focusing more on the needs of people. The practice of modernizing and widening the roads and enlarging parking lots for more traffic should be carefully considered. Public transportation could deliver visitors in more predictable numbers based on the carrying capacity of the park resources and could provide interpretive opportunities on the vehicles. More control could be exercised over human/animal interactions, at least in the most sensitive habitat areas of the park. Unique and fragile geothermal, archaeological, and historic resources could be better protected.

Improved safety and less need for law enforcement and traffic management work by park staff would be likely outcomes of reduced reliance on private vehicles for visitor transport.

The development of transportation systems in portions of Yellowstone would also provide the potential for a broader range of visitor experience. At present, nearly all visitor exposure to the park involves private vehicle trips and short walking excursions through developed areas. The vehicle trips are frequently in congested conditions among long lines of cars and RV's. VTS services could offer a distinctly different type of experience, if significant reductions in private vehicular trips could be achieved.

PARK OVERVIEW

REGIONAL CONTEXT

Yellowstone National Park is located in the northwestern corner of Wyoming, with portions that extend into southwestern Montana and southeastern Idaho. The park lies within Wyoming's Teton and Park counties, Montana's Park and Gallatin counties, and Idaho's Fremont County.

Yellowstone National Park is a key component of the regional economy. Five gateway communities — Gardiner, Cooke City, and West Yellowstone, Montana and Cody, and Jackson, Wyoming — are on the major access roads to the park. Other nearby cities include Billings, Bozeman, Butte, Livingston, and Red Lodge, Montana; Idaho Falls, Idaho; and Dubois and Lander, Wyoming. The gateway communities, and to a lesser extent the regional cities, rely heavily upon tourist revenue for the support of local economies.

The Interstate highway system allows extensive access to and through the greater Yellowstone area. Interstate 90 passes through the northern part of the region, serving east-west travel. Interstate 15 serves north-south travel in the western part of the region. Interstate 25 and Interstate 80 border the region on the east and south, serving as primary access routes. The network of roads in the area is of fundamental importance to nearly all resource- and tourism-related activities. Park roads are maintained to serve a variety of purposes including touring and sightseeing, access to recreational facilities, administrative uses, access to trailheads, and fire management. The roads are also used as links for through-traffic between the gateway communities.

PARK PURPOSE

By Act of Congress on March 1, 1872, Yellowstone National Park was "dedicated and set apart as a public park or pleasuring ground for the benefit and enjoyment of the people" and "for the preservation, from injury and spoliation, of all timber, mineral deposits, natural curiosities, or wonders...and their retention in their natural condition." Yellowstone National Park, by provision of its establishing act, is a natural area. Yellowstone's significance was seen initially in its "natural curiosities and wonders." The park's significance has evolved to include its role as a refuge for threatened and endangered wildlife, a reservoir of biological diversity, and, as the world's first national park, a cultural phenomenon.

MAJOR RESOURCES

Yellowstone National Park encompasses 2,221,722 acres (3,472 square miles) in the northern Rocky Mountains. The commanding features that initially attracted interest, and led to the reservation of Yellowstone as a national park, were geological — the geothermal phenomena, the colorful Grand Canyon of the Yellowstone, the fossil forests, and the size and elevation of Yellowstone Lake.

With the establishment of the park road system, the natural features and the pristine conditions within the park became accessible to millions of people. Today, Yellowstone is considered one of the premier wildlife viewing units in the national park system. In general, each road within the park is within a landscape setting of significant visual quality. The pristine conditions, the striking geological, thermal, and hydrologic features, and the presence and variety of wildlife all contribute to the outstanding visual resources of Yellowstone. Wildlife viewing opportunities are unpredictable, although certain areas, such as the Hayden Valley, offer consistently good chances for viewing. As visitors move through significant habitat areas, viewing opportunities increase. This situation often occurs where roads cross major meadows.

REGIONAL LOCATION

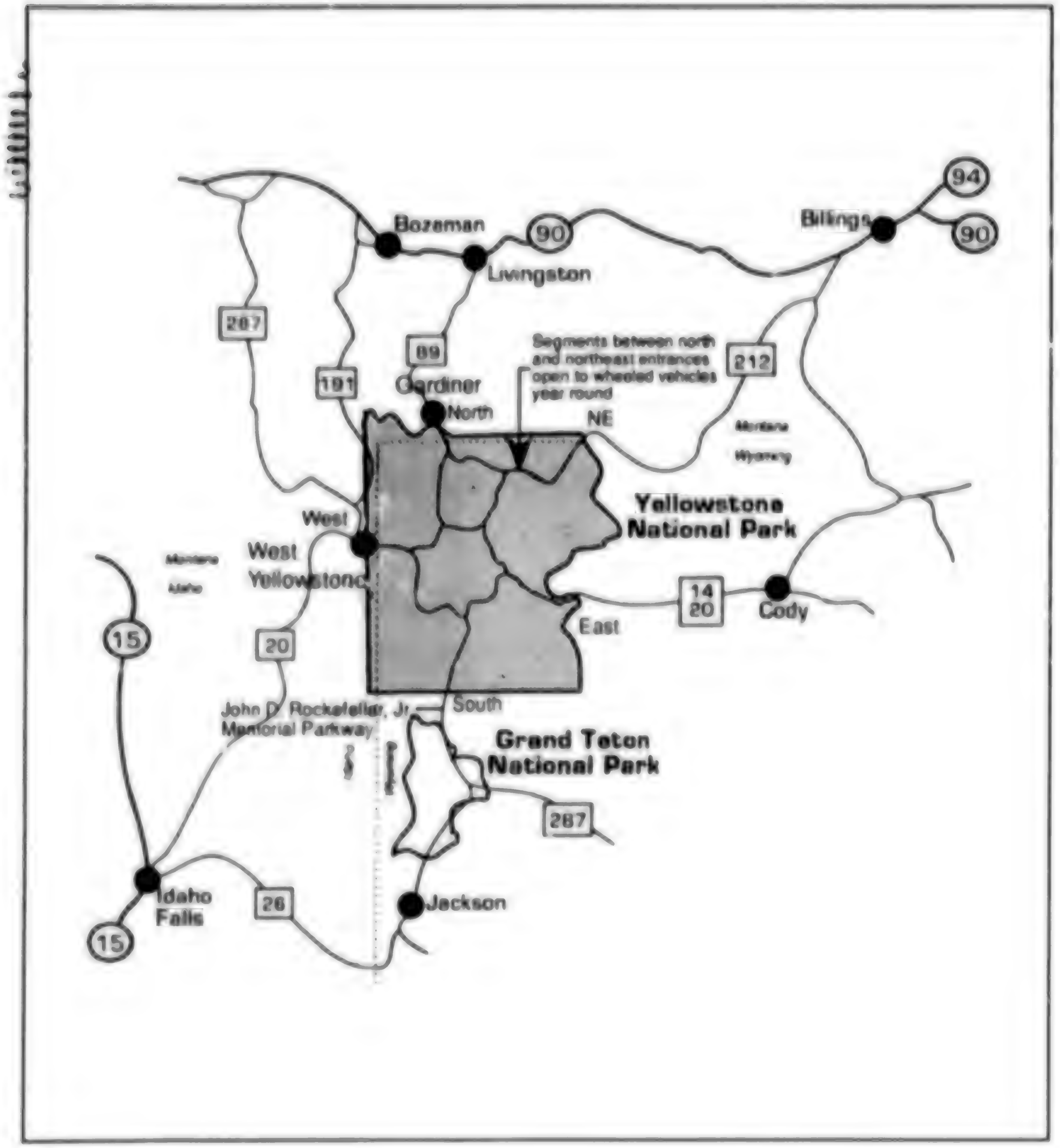
LEGEND

■ PARK LOCATION

YELLOWSTONE
NATIONAL PARK

ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC · [illegible]


Bozeman
90
Livingston
Billings
94
90
287
89
191
Gardiner
North
Segments between north and northeast entrances open to wheeled vehicles year round
212
NE
Montana
Wyoming
Yellowstone National Park
West
West Yellowstone
Montana
Idaho
15
20
14
20
Cody
East
South
John D. Rockefeller, Jr. Memorial Parkway
Idaho
Wyoming
Grand Teton National Park
287
Idaho Falls
26
Jackson
15

PARK VICINITY

LEGEND

▨ PARK

(15) INTERSTATE HIGHWAY

[20] PRINCIPAL ROAD

YELLOWSTONE
NATIONAL PARK

ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC / SEP 93 / [illegible]

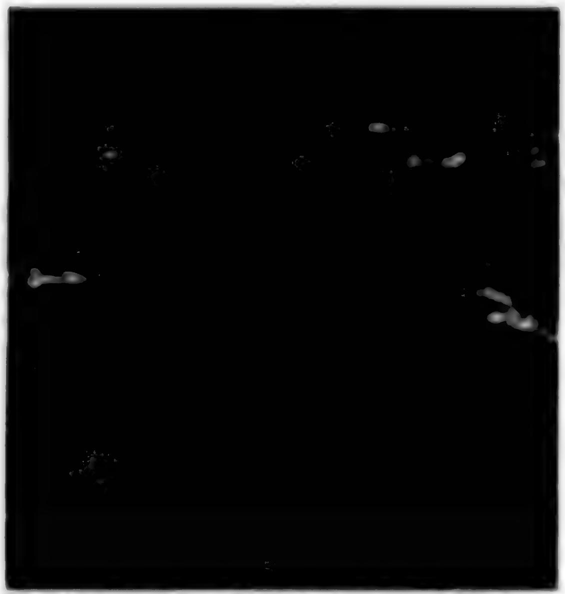
In addition to the natural resources of the park, Yellowstone has significant cultural resources. There are 952 historic structures on the List of Classified Structures (LCS); of these 553 are eligible for listing or are listed on the National Register of Historic Places. The remaining 399 structures still need to be evaluated for eligibility. Five historic structures have been designated as National Historic Landmarks -- the museums at Madison, Norris, and Fishing Bridge; the northeast entrance station; and the Old Faithful Inn. The majority of Yellowstone's historic structures are located within six historic districts and other developed areas including the Old Faithful Historic District, the Mammoth Historic District, the Lamar Buffalo Ranch, and the Lake Fish Hatchery District. Other examples of historic structures range from the Lake Hotel to backcountry cabins, fire towers, and interpretative kiosks. All of the park's historic districts and landmark sites are located within a management area called the park cultural zone. The protection of cultural resources may take precedence over natural resources within this zone. Yellowstone also is home to over 400 known archaeological sites, although over 95% of the park is unsurveyed.

PARK ENVIRONMENT

Topography

Yellowstone National Park is on a large mountainous plateau in the northern Rocky Mountains. Elevations range from 5,200 feet to over 11,000 feet and average 8,000 feet. The park is characterized by several broad, forested, volcanic plateaus surrounded by the Absaroka Range on the east, the Gallatin Range on the north, and the Red Mountains on the south.

A portion of the continental divide is on the western side of the park.



Elevations range from 5,200 feet to over 11,000 feet.

Climate

The high mountains affect the park's climate and precipitation, which in turn influence the ecosystem of the park. Prevailing winds are from the west; the large storms that bring the most rain and snow usually blow in from the Pacific Ocean. As air rises to get over this high country, it cools and drops its moisture as rain or snow, which falls most heavily on higher elevations. The highest peaks receive between 200 to 400 inches of snow per year. Drier areas are located in the rain shadows of the mountain ranges.

Yellowstone's climate has four distinct seasons. Winter is characterized by daily maximum temperatures below freezing, with snow accumulations beginning in late October. Winter conditions last into late March or early April. Spring brings melting snow, cool to cold nights, and cool to warm days beginning in early April and lasting into June. Summer lasts through August and is characterized by warm days, frequent thunderstorms, and infrequent freezing nighttime temperatures. In September, freezing nighttime temperatures and warm to cool days signal the beginning of a brief fall.

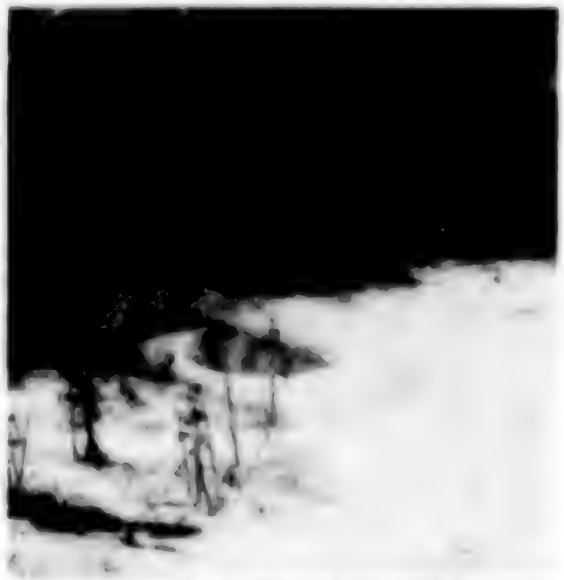
Geology and Thermal Areas

Past geological events have created the unique landscape of Yellowstone National Park. The Absaroka Range was formed from lava and ash flows during one of several volcanic periods 40-50 million years ago. Additional episodes of volcanism produced the Yellowstone Plateau volcanic field. Eruptions during this period formed several caldera, one of which enveloped a large, central portion of the park. Two periods of glaciation further shaped the park's topography after the last volcanic eruptions.

One outcome of these past geological events was the deposition of various rock types and surface materials in the park. Surficial deposits of soils and rock material were left by receding glaciers or deposited by running water or wind, rhyolitic tuffs and flows, and andesitic tuffs and flows. Many of the structural problems of the present park road system and the challenges of road building and maintenance are caused by these underlying materials.

The park is still geologically active today. The average uplift between 1923 and 1964 was about 0.6 inch per year. Since 1984, however, the area has actually been receding at a rate of 0.08 inches per year. Geologic benchmarks have been placed along the Grand Loop Road by the Cascades Volcano Observatory of the U.S. Geological Survey. The benchmarks used to measure minute changes that may indicate volcanic activity and explosion potential.

About 60% of the world's fumaroles, boiling springs, and geysers are located in Yellowstone. There are nine major basins of geyser and hot spring activity in the park and more than 100 additional clusters of hot springs spread throughout an area of 1,800 square miles.



The mud volcano is a popular geothermal attraction located adjacent to the Grand Loop Road in Hayden Valley.

Soils

The central part of the park is underlain by rhyolitic volcanic rocks; most of the remainder is underlain by andesitic volcanic rocks. Soils that developed from these two distinct rock types differ in mineral nutrient content and water-holding capacity, both factors of primary importance to plants. Rhyolitic soils tend to dry out more quickly and have few plant nutrients. Andesitic soils generally are higher in organic matter, silt, and clay, providing water for most of the growing season and better growing conditions for plants. A small portion of the soils are derived from sedimentary sources, including limestone, sandstones, and shales.

Soils vary from dry, heavy, near-desert soils to fine-to-course subalpine soils of the forest and mountain meadows, to alpine soils. Except for some parts of developed areas and a few hundred acres in previously cultivated areas, the soils are in a pristine condition.

Water Resources

Yellowstone encompasses a 3,500 - square mile watershed that preserves one of the most significant and near pristine aquatic environments in the United States. The surface water resources within Yellowstone total 112,000 acres. The park contains 175 lakes totaling approximately 108,000 surface acres and 604 streams totaling 3,785 miles of running water. Lakes such as Yellowstone, Shoshone, Lewis, and Heart are prominent features in the park, as are the Yellowstone, Snake, Lewis, Madison, Gibbon, Firehole, Gardner, and Lamar Rivers. The headwaters of the Missouri and Columbia Rivers are located along the Continental Divide in Yellowstone.

Vegetation

There are three major forest zones in Yellowstone: the spruce/fir zone, the lodgepole pine zone, and the Douglas-fir zone.

The spruce/fir zone is dominated by forests composed of Engelmann spruce and subalpine fir and can be comprised of all growth stages from young to mature stands. Young stands are typically dominated by lodgepole pine, which gives way to a mixture of spruce and fir with lodgepole pine, and at higher elevations, whitebark pine. These forests grow predominantly in andesitic soils.

The lodgepole pine zone is dominated by lodgepole pine, with very little spruce and fir present. About 80% of the Yellowstone forest is lodgepole. However, whitebark pine may be present in all age stands. These forests grow predominantly on rhyolitic soils.

The Douglas-fir zone is dominated by Douglas-fir, with snowberry understory common in younger stands. Douglas-fir stands are frequently intermixed with stands of sagebrush and grasses. There are stands of limber pine and Rocky Mountain juniper in lower elevations and aspen groves in areas of patchy pine forest.

The nonforested land in the park is composed of five types: wetland meadow, sagebrush/grassland, subalpine/alpine meadow, thermal areas, and talus. Typical upland understory plants are grouse wholeberry, elk sedge, kinnikinnick, fescue, and bluejoint redgrass.

There are no federally listed threatened or endangered plant species in Yellowstone.

Wildlife

Over 60 species of mammals, hundreds of species of birds, six species of reptiles, four species of amphibians, and many native and introduced species of fish inhabit the park.

Examples include grizzly bear, black bear, elk, bison, moose, pronghorn antelope, mule deer, bighorn sheep, coyote, mountain lion, badger, porcupine, snowshoe hare, river otter, marten, long-tailed weasel, red squirrel, beaver, northern pocket gopher, Uinta ground squirrel, golden eagle, osprey, trumpeter swan, harlequin duck, American white pelican, Caspian tern, common loon, sandhill crane, great gray owl, Steller's jay, red crossbill, sagebrush lizard, rubber boa, Arctic grayling, and cutthroat trout.

Four species that currently occur in the park are protected by the Federal Endangered Species Act — These species include the endangered peregrine falcon (Falco peregrinus), bald eagle (Haliaeetus leucorcephalus), and whooping crane (Grus americana), and the threatened grizzly bear (Ursas horribilis). The gray wolf (Canis lupus) listed as an endangered species, was extirpated early in this century. There is a possibility that the wolf has returned to the greater Yellowstone ecosystem.

EXISTING CONDITIONS

VISITATION

Peak Season

Yellowstone National Park is one of the most popular tourist attractions in the United States. Over three million people visited the park in 1992. As shown in figure 1, visitation has been steadily increasing since 1980.

The peak season (June-August) accounts for about two thirds of the annual visitation.

Visitation gradually increases in the early spring as roadways are cleared of snow. Relatively gradual increases occur during June, with visitation increasing rapidly thereafter. Figure 2 shows that the peak visitor season begins in early July and continues through mid-August. The peak season, as indicated in table 1, accounts for about two thirds of the total annual visitation.

During the peak season, campgrounds, lodging, visitor centers, restaurants, service stations, and shops are utilized at or beyond their capacity. During a typical summer day, 84% of the visitors are clustered in the park campgrounds, thermal and scenic viewing areas, and developed areas that line the park roadways. Most overnight visits occur in campgrounds and cabins or hotels. Only 7% of visitors hike off of the main roadways into the park interior. Even fewer (1%) stay overnight in the backcountry. The National Park Service estimates that 20,000 to 25,000 persons are inside the park during a typical peak-season evening.

Because of the variations in visitation, Park Service staff levels must be adjusted on a seasonal basis. For example, in 1991 the Park Service employed a low of 421 persons during the winter months. Beginning in April, however, seasonal staff steadily increased. Fifty-four additional employees arrived during April, 118 more in May, and 153 more in June. Six additional employees came in July, when a peak total of 752 employees was reached. Staff levels then dropped steadily throughout the fall of 1991 and the winter of 1992; a low of 414 was reached in March 1992.

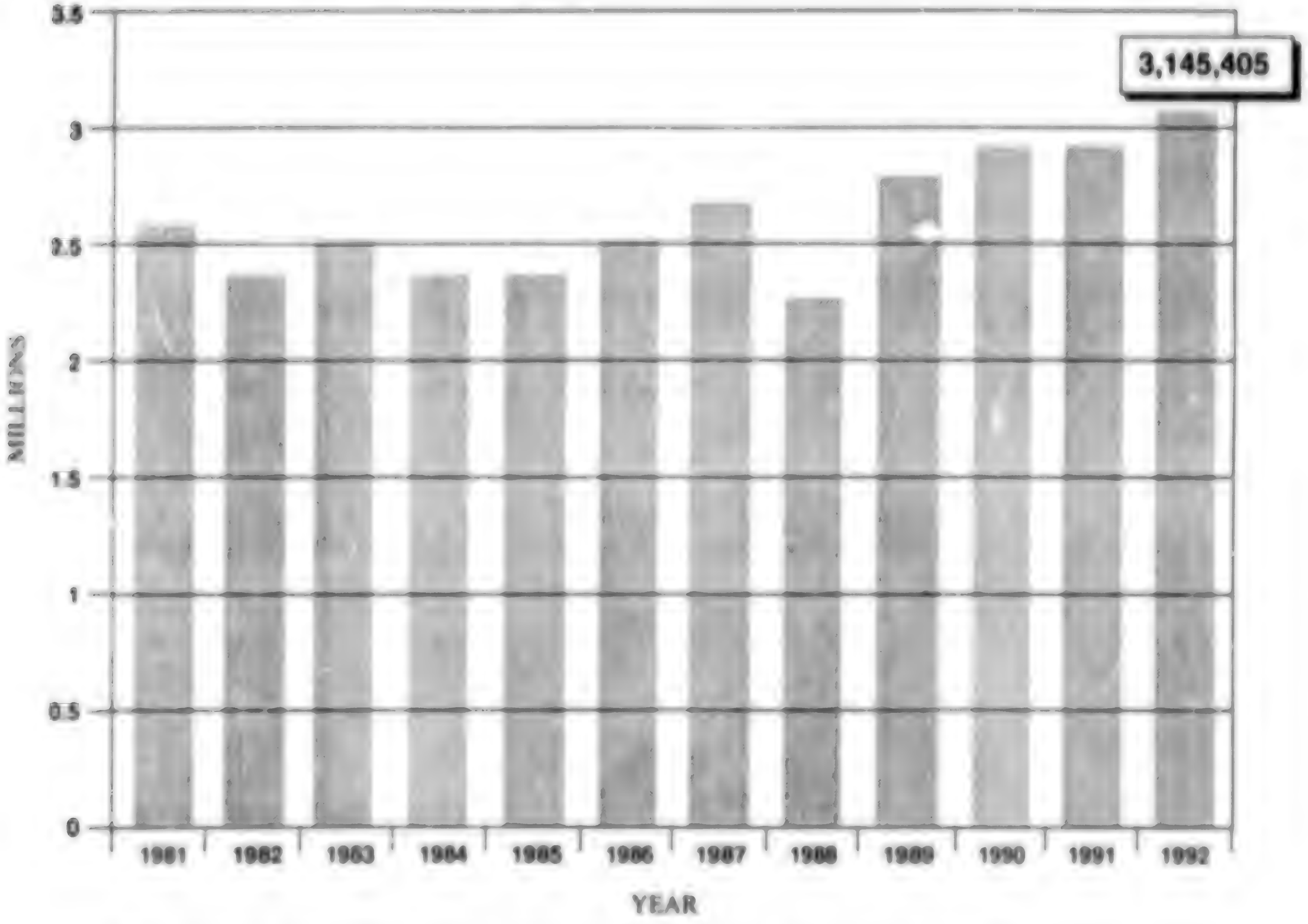
Park concessioners adjust their staff even more dramatically. TWRS employs approximately 2,600 employees. Only 85 are permanent employees. Other park concessioners show similar seasonal staffing fluctuations, as presented in table 2.

Non-Peak Season

In the last two decades, visitation to Yellowstone during the shoulder seasons (April 1 through May 31 and September 1 through November 30) has increased gradually. Each shoulder season receives more visitation than the entire winter season (December 1 through March 31).

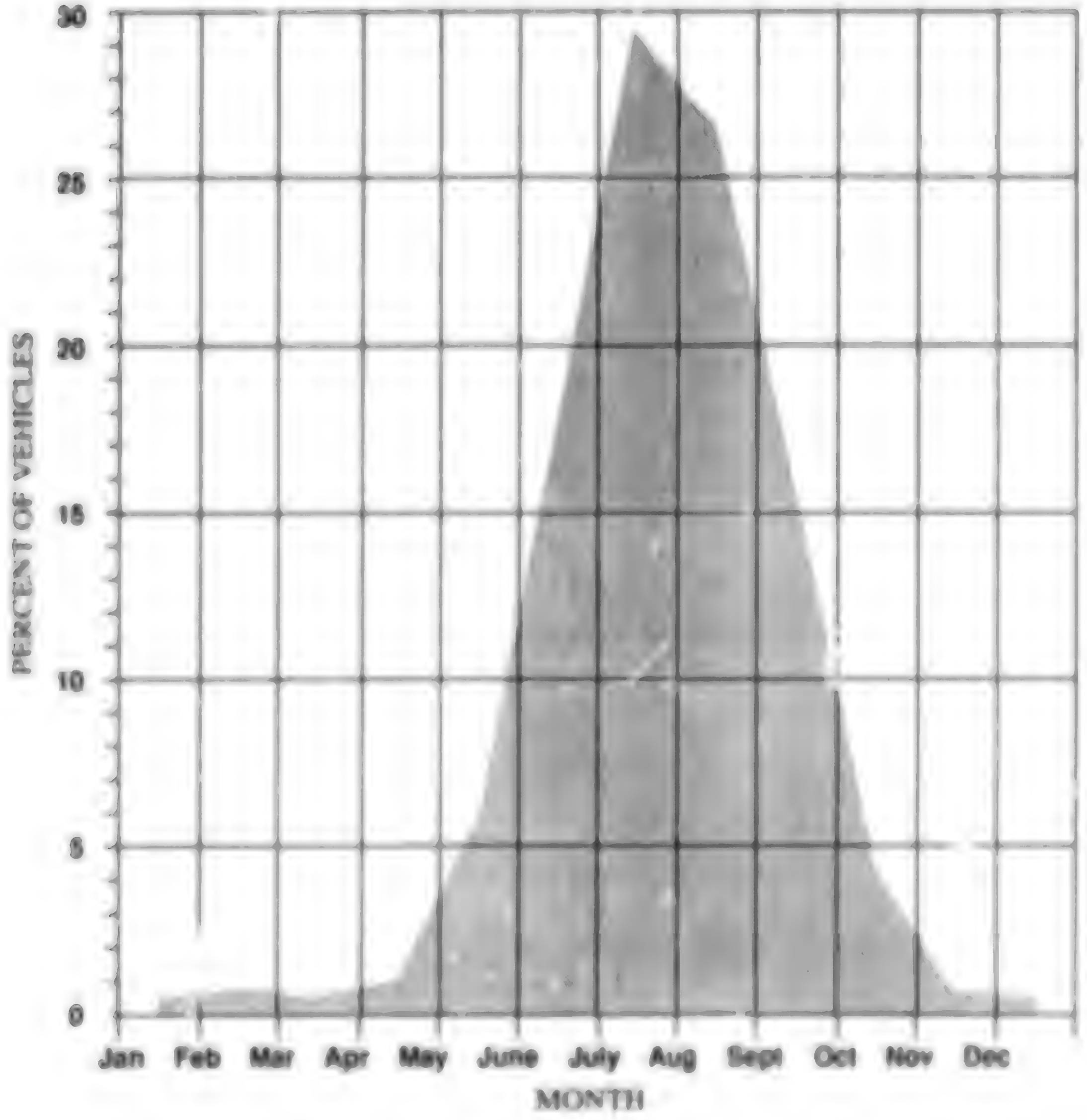
Winter visitation to the greater Yellowstone area is increasing rapidly; nearly doubling in the last ten years, as presented in figure 3. Table 3, located on page 18, shows that in the last three years, winter season visitation has accounted for about 3% to 4% of all visitation. Total visits for the 1992-1993 winter season rose dramatically to 140,000.

Figure 1: Yellowstone National Park
Annual Park Visitation



Source: Yellowstone National Park, Statement for Management, 1991 (1981-1990); Office of Visitor Services (1991)

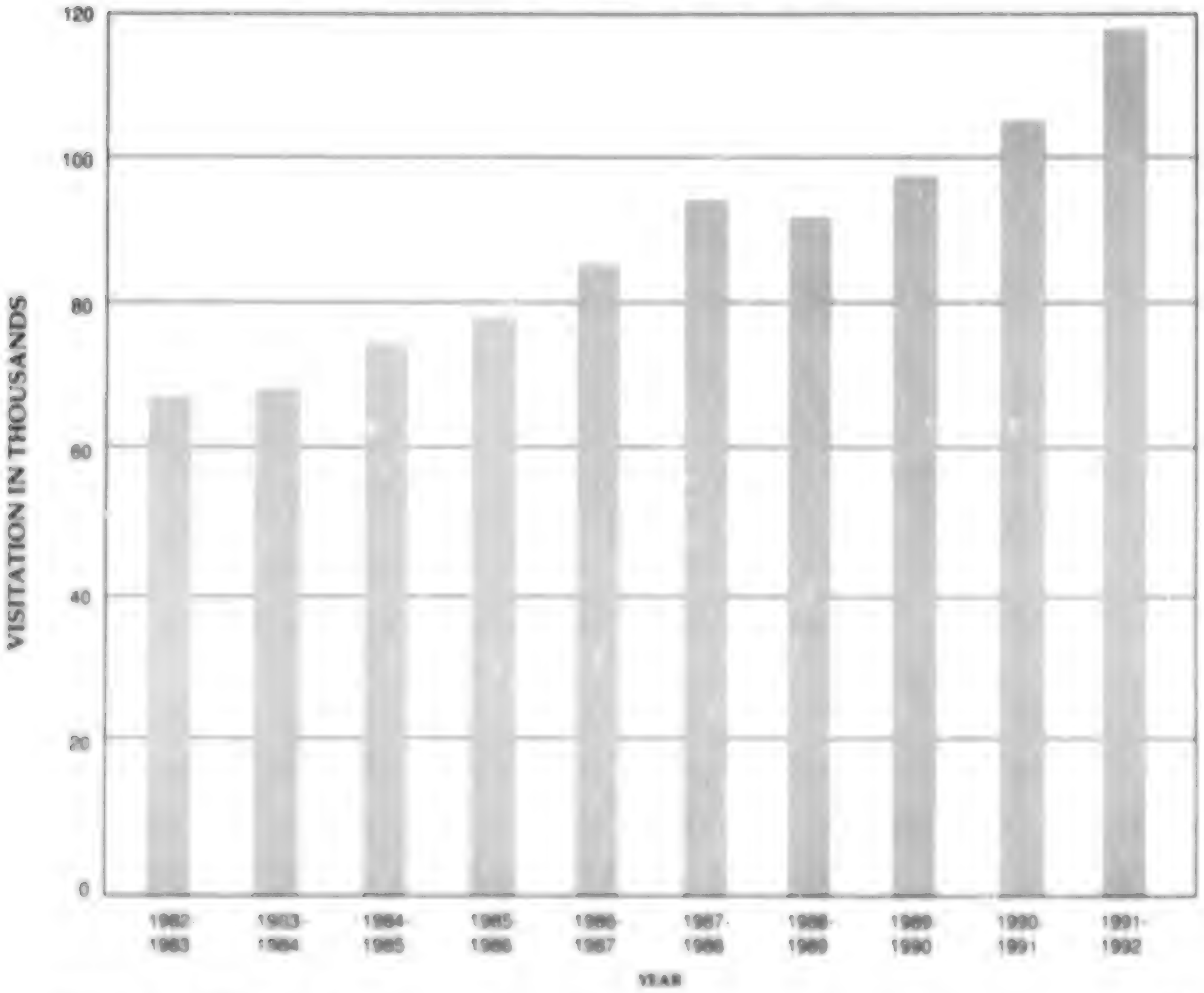
Figure 2: Yellowstone National Park
Year 1991 Monthly Park Visitation



Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

Figure 3: Yellowstone National Park

Winter Season Visitation *



* Winter season defined as December 1 to March 31.

Source: Yellowstone National Park. Winter Use Plan Environmental Assessment. 1991 (1982-83 to 1989-90). Yellowstone National Park. Office of Visitor Services (1990-91 to 1991-92).

Table 1: Peak Season Visitation As A Percentage of Total Visitation, 1990-1992

Year	Total Visitation	Visitation June-August	% of Total Visitation
1990	2,857,096	1,981,888	69
1991	2,957,856	2,038,146	68
1992	3,145,405	2,082,249	66

Source: Yellowstone National Park, Office of Visitor Services

Table 2: Seasonal and Permanen. Employment Levels of Major Park Employers, 1991

Employer	Seasonal	Permanent	% Seasonal	Total
National Park Service	468	284	62	752
TW Recreational Svcs.	2,515	85	97	2,600
Hamilton Stores	799	35	95	834
YPSS (Service Stations)	92	3	97	95
Medical Services	35	5	87	40
Total	3,909	412	89.5	4,321

Source: National Park Service, 1992

Winter recreational activities such as snowmobiling and ski touring have become increasingly popular. The gateway communities of West Yellowstone and Gardiner, and the Flagg Ranch complex 2 miles beyond the south entrance on John D. Rockefeller, Jr. Memorial Parkway, have become important winter staging areas. From a base of virtually no winter visits 30 years ago, the National Park Service counted 140,000 visits to Yellowstone in the 1992-1993 winter season. More winter visits are made to the national forest areas that surround Yellowstone and a wider range of recreational activities are available there.

The majority of the roads in the park are not plowed in the winter. The roads between Mammoth Hot Springs and the northeast entrance, Mammoth Hot Springs and Gardiner, and U.S. Highway 191 in the northwest corner of the park are the only roads that are kept open year-round. The John D. Rockefeller, Jr. Memorial Parkway through Grand Teton National Park to Flagg Ranch is also kept open year-round. Visitors reach the park features via snowmobiles, snow coaches, and cross-country skis. Staging areas or points of access for the oversnow routes into the parks are an important component of the winter visitor experience. They typically include a parking area with appropriate signing and may have restrooms, a warming hut, and snowmobile rental facilities. Snowcoach routes offered by TWRS and other concessioners provide access to the park from some staging areas. The staging areas for trips into Yellowstone are near Mammoth Hot Springs in the north, at Pahaska Tepee in the Shoshone National Forest near the east entrance, at a parking area just north of Flagg Ranch near the south entrance, and in the city of West Yellowstone near the west entrance. The Mammoth staging area is the only area specifically designed for this purpose. The other staging areas become congested during peak days because of small or undefined parking and unloading areas. There are numerous difficulties in serving the increasing number of winter visitors, including a shortage of all-weather facilities and the dangers of exposure to subzero temperatures.

Table 3: Winter Season Visitation As A Percentage of Total Visitation, 1990-1992

Year	Total Visitation	Visitation December-March	% of Total Visitation
1990	2,857,096	99,414	3.5
1991	2,957,856	106,115	3.6
1992	3,145,405	119,762	4.0

Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

In 1988 the state of Wyoming proposed the Continental Divide Snowmobile Trail — a major long-distance snowmobile trail that would connect Yellowstone and Grand Teton National Parks to existing trails beginning in Lander, Wyoming, 300 miles to the south. Currently the trail has been completed to about 7 miles east of Moran Junction, a distance of 270 miles. The eventual goal is to provide 375 miles of continuous trail, stretching through the John D. Rockefeller Jr. Memorial Parkway and Yellowstone to a terminus at West Yellowstone.

VISITOR USE PATTERNS

The mode of access of Yellowstone visitors is shown in table 4 and the number of vehicles entering the park by type is shown in table 5. Automobiles accounted for 83% of the visitors and 80% of the vehicles entering Yellowstone in the 1991 season.

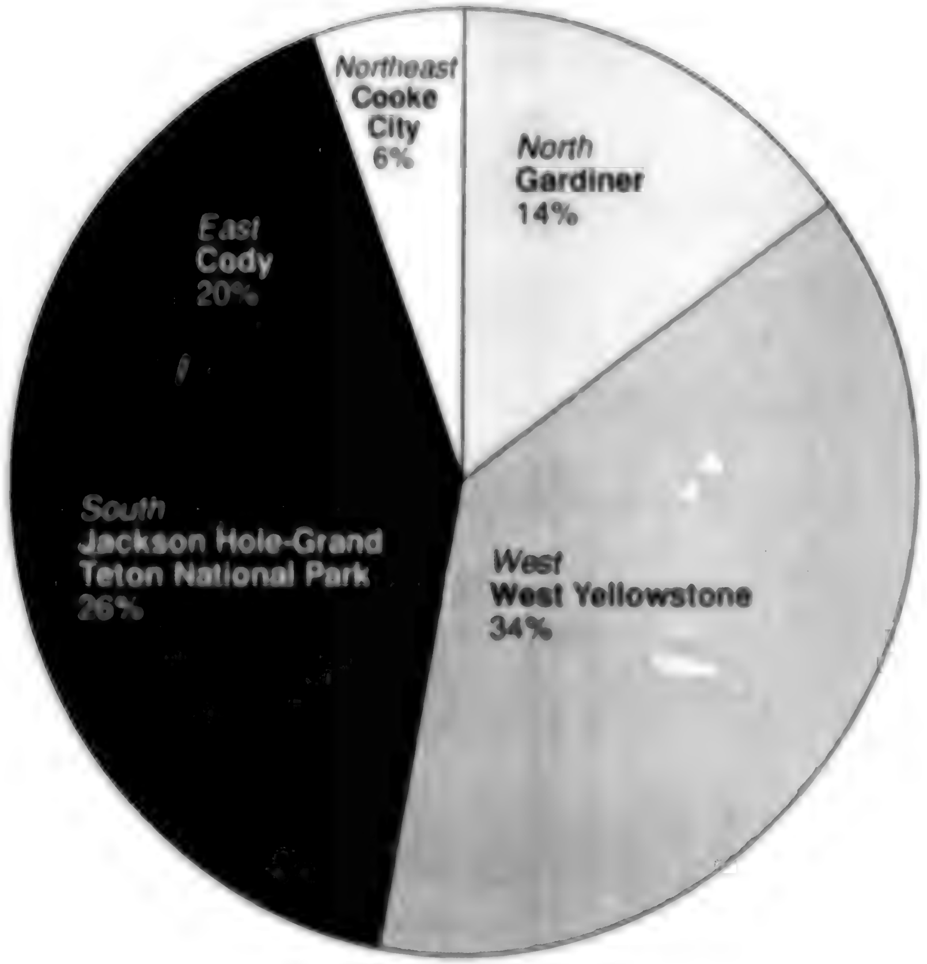
During peak season, visitors enter Yellowstone through one of five entrance gates. In decreasing order of population, visitors enter from the west via West Yellowstone, Montana; from the south via Grand Teton National Park and Jackson, Wyoming; from the east via Cody, Wyoming; from the north via Gardiner, Montana; and from the northeast via Cooke City, Montana. The percentage of entering vehicles by gate is shown in figure 4.

Although the northeast entrance currently accommodates the fewest park entries, planned improvements to the roadway system outside of the park may stimulate an increase in its level of use. The Chief Joseph Scenic Highway between U.S. highways 212 and 14/16/20 through the Sunlight Basin area is being upgraded to an all weather, 44-foot-wide, two lane facility. The improvements will provide a principal roadway link between Cody and Cooke City and year-round access to the northeast entrance of Yellowstone from the east.

The northeast entrance near Cooke City, Montana, might experience an increase in level of use.

The most popular visitor destinations within Yellowstone are, in order, Old Faithful, Canyon, Lake, Grant Village/West Thumb, Madison, Norris Geyser Basin, Mammoth Hot Springs, Fishing Bridge, and Tower-Roosevelt. The most common visitor activities are viewing wildlife and thermal features, photography, pleasure walking, and visiting museums and visitor centers.

Figure 4: Yellowstone National Park
Year 1992 Vehicles Entering by Gate



Source: Yellowstone National Park, Office of Visitor Services, Cumulative Travel by Entrance Station Statistics

Table 4: Visitor Totals by Mode of Transportation

Method of Transportation	1989	%	1990	%	1991	%
Automobile	2,189,742	82.81	2,361,213	83.63	2,432,472	83.29
Recreational Vehicles	287,229	10.86	293,115	10.38	300,441	10.29
Bus Passenger (Commercial)[a]	6,615	.25	5,889	.21	0	.00
Bus Passenger (Non-Commercial)	89,535	3.39	86,141	3.05	99,794	3.42
Private Oversnow Vehicles	58,289	2.20	63,403	2.25	73,857	2.53
Snowcoach Passengers	10,467	.40	11,162	.39	11,174	.38
On Foot & Other Methods	2,565	.10	2,649	.09	2,676	.09
Total Visitors (Rec'l)	2,644,442	100	2,823,572	100	2,920,414	100
Total Visitors (Non)	35,934		33,524		37,319	
Total Visitors	2,680,376		2,857,096		2,957,733	

Source: Yellowstone National Park, Office of Visitor Services

[a] The park did not differentiate between commercial and non-commercial bus passengers in 1991

Table 5: Vehicles Entering Yellowstone by Type of Vehicle

Method of Transportation	1989	%	1990	%	1991	%
Automobile	729,914	80.14	787,071	81.91	810,824	80.29
Recreational Vehicle	95,743	10.51	97,705	10.04	100,147	9.92
Buses (Commercial)[a]	738	.08	644	.07	0	.00
Buses (Non-Commercial)	3,415	.37	3,408	.35	4,754	.47
Private Oversnow Vehicles	49,916	5.48	54,764	5.63	61,735	6.11
Snowcoaches	1,152	.13	1,265	.13	1,264	.13
Non-Recreational (All vehicle types)	29,971	3.29	27,952	2.87	31,113	3.08
Total Vehicles	910,849	100	972,809	100	1,009,837	100

Source: Yellowstone National Park, Office of Visitor Services

[a] The park did not differentiate between commercial and non-commercial buses in 1991

Table 6: Recreational Visits and Visitor Days

Year	Visits	Visitor Days[1]	Days/Visit
1981	2,521,831	6,506,800	2.6
1982	2,368,897	7,021,500	3.0
1983	2,347,242	6,945,100	3.0
1984	2,222,027	6,644,600	3.0
1985	2,226,159	6,595,900	3.0
1986	2,363,756	6,969,800	2.9
1987	2,573,294	7,400,500	2.9
1988	2,182,113	6,325,800	2.9
1989	2,644,442	7,953,800	3.0
1990	2,823,600	8,178,000	2.9
1991	2,920,500	8,435,400	2.9

Source: National Park Service Statistical Abstract

[1] A visitor day is defined as twelve visitor hours in a park.

NPS statistics show that each park visit lasts an average of about three days. As shown in table 6, this average has remained constant over the last 10 years.

A significant percentage of visitors come to Yellowstone while en route to or coming from another nearby national park, especially Glacier National Park in north central Montana and Grand Teton National Park south of Yellowstone. A recent study found that over 80% of all Yellowstone visitors visited another national park as part of their trip. Clearly, not many Yellowstone visitors are making a single-purpose trip from home to the park. Other nearby attractions include the Little Bighorn (Custer) National Battlefield in south central Montana, Bighorn Canyon National Recreation Area astride the Montana and Wyoming border, Devil's Tower National Monument in northeast Wyoming, Mount Rushmore National Memorial in western South Dakota, and Rocky Mountain National Park in north-central Colorado. Consequently, many visitors experience Yellowstone and other parks through their windshields, as time constraints and a desire to see a number of parks limit time outside their private vehicles. These visitors will usually enter Yellowstone at one location and exit the park at another. A 1993 survey of Yellowstone visitors indicated that less than 30% enter and leave the park through the same entrance.

Visitor Characteristics

More than 85% of park visitor groups number from two to four people (nearly 50% of visitor groups number two people). Three out of every four visitor groups are families. The most common age groups are children younger than fifteen years old (about one-fourth of all visitors) and adults aged 31-45 (another one-fourth). Senior citizens (age 55 and above) comprise another one-fourth of park visitors.

Nearly half of all visitors are making their first trip to Yellowstone and one-third are making a second, third, or fourth trip. About 7% of the park's visitors are from outside of the U.S. (primarily from Canada and Germany). As shown in figure 5, 40% of all visitors come from Idaho, Utah, California, Wyoming, Montana, or Colorado.

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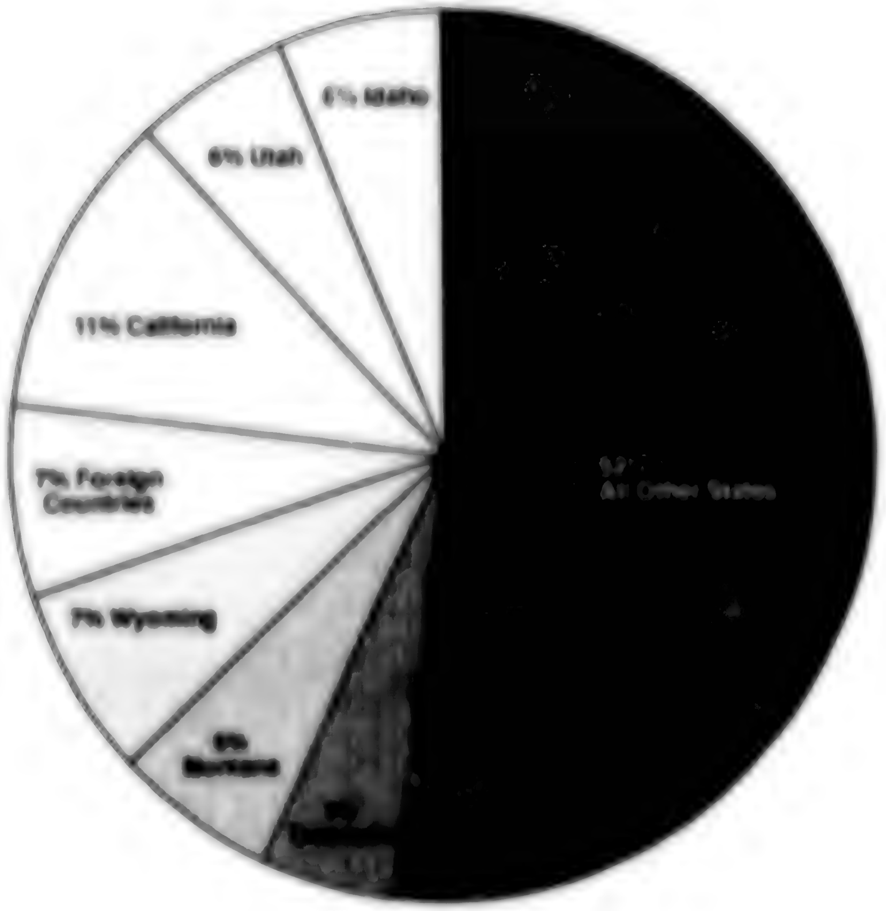
Figure 5: Yellowstone National Park

Visitor Home Locations



Source: Visitor Services Project, University of Idaho

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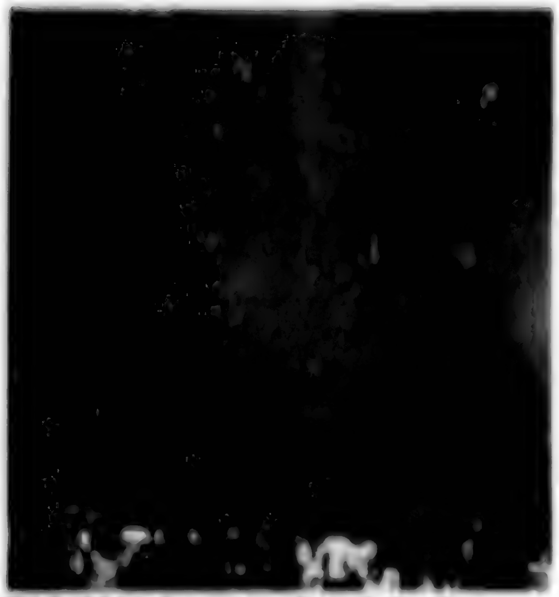
Old Faithful is the most popular park attraction.

Many visitors travel great distances to see Yellowstone.

The nearby states of Wyoming, Montana, Utah, and Idaho send visitors to Yellowstone in numbers disproportionate to their populations. About 25% of all Yellowstone visitors in 1990 came from these four states, which have a combined population of nearly four million — or just 1.5% of the entire United States population. This large contingent of visitors may feel that Yellowstone is their park. The representation of all states and several foreign countries in visitor origins, and the great distances traveled by some visitors, clearly indicate the special attraction of the park for Americans and visitors from other countries.

VISITOR FACILITIES

Three primary concessioners provide facilities and services to park visitors. TW Recreational Services (TWRS) provides nearly 2,200 overnight lodging units, 18 food service outlets, 10 gift shops, one marina, three stables, various transportation services, two camper services operations with public showers and laundries, and an RV park with 358 sites. Table 7 summarizes the park lodging facilities.

Hamilton Stores, Inc. operates 15 general stores, with limited food service in eight outlets. Yellowstone Park Service Stations (YPSS), a joint venture between TWRS, Hamilton Stores, and the National Park Service, provides gasoline and wrecker and repair service. YPSS operates eight service stations and has wrecker and repair services at four locations.

Food service facilities are presented in table 8, located on page 25. These are operated throughout Yellowstone primarily by TWRS. Nearly all of these facilities are operated during peak season only and are frequently congested. During the winter season, food service is available at the Mammoth Hot Springs Hotel, the Mammoth Hot Springs Hamilton Store, Old Faithful Four-Seasons, and the Old Faithful Snowlodge. The National Park Service and concessioners also operate winter warming huts throughout the park that offer vending machines and vault toilets.

The National Park Service operates 11 campgrounds throughout the park. These are listed in table 9, located on page 26. An RV park at Fishing Bridge is operated by TWRS.

The widely scattered developed areas in the Yellowstone region provide a variety of services to visitors. Hotel and motel rooms and campsites are available year-round, although

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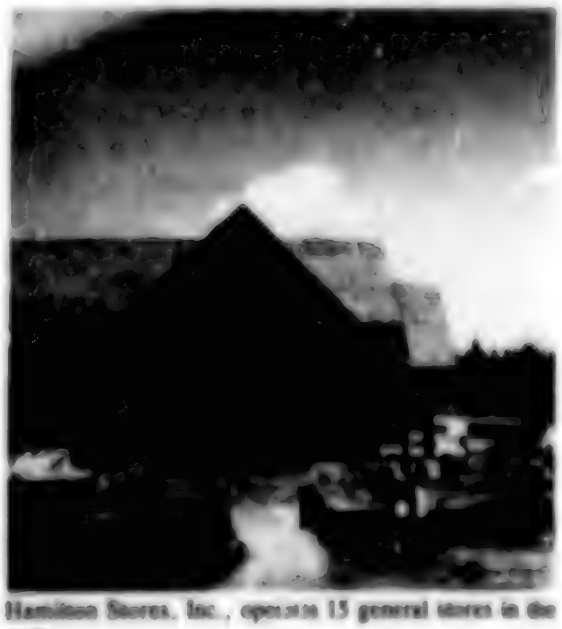
Table 7: Park Lodging Facilities and Numbers of Rooms

Facility	Bed Total	Rooms	Opening & Closing Dates (Peak Season)
Yellowstone Lake Hotel and Cabins	527	296	5/18-9/27
Yellowstone Lake Lodge (Cabins)	318	186	6/8-9/13
Mammoth Hot Springs Hotel and	462 (summer)	223 (summer)	5/22-9/20
Cabins	191 (winter)	132 (winter)	12/16-3/16
Old Faithful Inn	630	328	5/8-10/11
Old Faithful Lodge (Cabins)	225	133	5/22-9/13
Old Faithful Snow Lodge	127 (summer)	65 (summer)	5/16-10/11
	222 (winter)	100 (winter)	12/14-3/14
Canyon Lodge (Cabins)	1,226	572	6/12-8/31
Roosevelt Lodge	145	80	6/6-8/27
Grant Village	570	299	6/1-9/27
Grand Total	4,548 (summer)	2,181 (summer)	
	413 (winter)	232 (winter)	

Source: TW Recreational Services, November, 1992



Hamilton Stores, Inc., operates 15 general stores in the park.

there is a reduction in capacity during the nonpeak season.

Hotels and motels are concentrated in the gateway communities surrounding the park and private campgrounds are distributed along the major access roads into the region. Public campgrounds are available in the surrounding national forests.

Each of the five gateway communities offer winter season accommodations. West Yellowstone, Montana provides the most extensive lodging and food service and rents more than 1,000 snowmobiles to guided and unguided parties. West Yellowstone offers reliable snowfall, direct access to the park via the west entrance, and proximity to groomed national forest snow trails.

Jackson, Wyoming also offers winter services and activities but caters more to the downhill skier than to the snowmobiler. Jackson is a destination resort with a major ski area of international reputation. Cross-country ski rentals, snowmobile rentals, guided trips into Yellowstone and national forest lands, winter lodging and food service are all available in Jackson. Gardiner, Montana offers snowmobile rentals and winter lodging and food service. Cooke City, Montana has relatively few services but does provide access to an

Table 8: Food and Beverage Service Locations and Seating Capacities

Location	Seating Capacity
Dining Rooms and Cafeterias	
Old Faithful Inn Dining Room	276
Canyon Cafeteria	275
Lake Hotel Dining Room	272
Old Faithful Lodge Cafeteria	209
Roosevelt Cook-Out	180
Lake Lodge Cafeteria	179
Grant Village Dining Room	170
Mammoth Dining Room (open winter)	154
Canyon Dining Room	150
Grant Village Steak House	128
Snowlodge Dining Room (open winter)	109
Terrace Grill (Mammoth)	104
Roosevelt Lodge Dining Room	76
Pony Express Fast Food (Old Faithful)	44
Four Seasons Fast Food (Old Faithful)	37
Snack Shops	
Larry's Lunch, Old Faithful Lodge (Take Out)	--
Lake Lodge Snack Shop	10
Canyon Village Snack Shop	40
Hamilton Store Snack Bars (8 locations)	--
Lounges	
Mammoth Hot Springs	40
Old Faithful Inn	84
Grant Village	26
Canyon Village	90
Total Seating Capacity	2,653

Source: Y.N.P., Office of Planning and Cultural Resources, December, 1992

Table 9: Park Campgrounds, Capacities and Operating Dates

Campground	Sites	Opening and Closing Dates
Mammoth	85	All year
Madison	292	May 1-November 1
Bridge Bay	420	May 22-September 14
Norris	116	May 15-September 28
Slough Creek	29	May 22-November 1
Tower Fall	32	May 22-September 14
Canyon Village	280	June 5-September 14
Indian Creek	75	June 5-September 14
Grant Village	403	June 22-October 12
Pebble Creek	36	June 12-September 8
Lewis Lake	85	June 12-November 1
Fishing Bridge		
RV Park (by TWRS)	358	May 22-September 7
Total Sites	2,211	

Source: National Park Service, 1992

extensive network of national forest trails and backcountry areas northeast of Yellowstone. Cody, Wyoming also supports winter activity in the area and local businesses are interested in expanding this sector of the economy.

TRANSPORTATION FACILITIES

Park Roads

The roadway system of Yellowstone National Park is known as the Grand Loop Road. The Grand Loop Road follows a rough figure eight design. Roads leading from park entrance stations in the west, south, east, north and northeast sections of the park intersect the Grand Loop Road at five locations. The total length of all park roads in Yellowstone is 539 miles (410 miles paved, 73 miles gravel or dirt and 56 miles of parking areas and pullouts).

Along with access to park features, the park roadways provide connections between surrounding communities of the greater Yellowstone region, such as Cooke City and Gardiner, Montana, and between West Yellowstone, Montana and Jackson, Wyoming. Earlier studies have identified the regional role of the Yellowstone roadways and further noted that "nonlocal visitor traffic flow is through the region, not in and out by the same route". Many highways in the three-state region lead to Yellowstone. Consequently, the importance of the Yellowstone National Park road system reaches beyond the borders of the park.

The use of the park roads for non-commercial through traffic purposes is an unintended aspect of the park's use. Through-travel of commercial vehicles is not permitted in the park. Yellowstone was not set aside or preserved to accommodate through-traffic or to shorten distances between regional communities. Nevertheless, distances are generally shorter on park (roads as shown in table 10) and the park is extensively used as a through-route. Anecdotal evidence suggests that some residents of regional communities object to paying park entrance fees when traveling through the park.

Table 10: Comparative Distances Between Principal Regional Cities Using Park Roads And Non-Park Roads

Trip	Via Park Roads	Via Non-Park Rds.	Miles Saved Using Park Roads
Cody, Wyoming to West Yellowstone, Montana (south, via Wyoming/Idaho)	135	423	288
Cody to West Yellowstone (north, via Montana)	135	358	223
Cooke City, Montana to West Yellowstone	91	303	212
Jackson, Wyoming to Cooke City	173	359	186
Cooke City to Gardiner, Montana	56	240	184
Jackson to Gardiner	159	288	129
Jackson to Cody	189	302	113
Gardiner to West Yellowstone	50	167	112
Gardiner to Cody	134	237	103

Source: BRW, Inc., October, 1992

The roadway system has been divided into fourteen segments for study purposes. These segments are shown on the following map. The main park roadways, including the John D. Rockefeller, Jr. Memorial Parkway, total 329 miles. The John D. Rockefeller, Jr. Memorial Parkway is administered by Grand Teton National Park. Following is a description of each roadway segment including visitor attractions, outstanding natural features, roadway conditions, and issues. A map follows the segment descriptions and documents the existing condition of all principal roadways.

Segment 1: Canyon Village to Norris Junction (13.1 miles). Segment 1 traverses the Solfatara Plateau. It is the shortest of the Grand Loop Road segments. Norris Geyser Basin at Norris Junction is the largest and hottest basin in the park. Canyon Village offers all visitor services and provides access to rim drives along the Grand Canyon of the Yellowstone. A one-way loop drive, 2.7 miles from Norris, takes visitors past Virginia Cascades. There is access to Ice Lake and Grebe Lake from this segment and a picnic area at Virginia Meadows. This segment is mainly forested habitat with extensive burned areas, wet forest meadows, and riparian areas along the Gibbon River. Fire has opened up views in the landscape along the road. Wildlife use along this forested segment may increase as fire-burned forest stands change to meadow.

The portion of this road segment that crosses and parallels the Gibbon River is of concern. Areas of severe burn would be susceptible to erosion and sedimentation if new construction or disturbance occurred. Segment 1 was prioritized fourth (out of seven) for "Resurfacing, Restoration and Rehabilitation" (3R) in the parkwide proposed road improvement program. These improvements were funded for construction in 1993. Seasonal average daily traffic (ADT) is 4,330 vehicles - ninth in volume of the 14 segments.

Segment 2: Mammoth Hot Springs to Norris Junction (22.6 miles). Segment 2 follows the Gardner River and Obsidian Creek drainage begins through a number of significant natural and cultural features. Mammoth Hot Springs is the site of park headquarters and offers a full range of visitor services and access to outstanding thermal features. A scenic meadow at Swan Lake Flat and moose viewing areas at Willow Park are 5 and 10 miles south, respectively. Interpretive exhibits of the 1988 fire and other views of fire damage are found 3 miles south of Mammoth and at Willow Creek. Several small lakes and the Appollinaris Springs picnic area flank the road. Sheepeater Cliffs, a historic Native American residence area and Obsidian Cliffs, where Native Americans collected obsidian for trading, are 8 and 13 miles south, respectively.

The Norris soldier station, an outstanding example of the Army period in Yellowstone, is near the end of the segment. Two campgrounds, at Indian Creek and Norris Junction, are accessible from this segment. The warm waters of the Gibbon River stay open all year, attracting elk and bison during the winter. Beavers are active in streams along this route. Swan Lake Flats is a summer home for a few of Yellowstone's trumpeter swans. The roadway follows mostly level ground. Road edges and cuts have healed with revegetation; however, some gravel surfaces lack erosion and sedimentation control because of undefined edge conditions.

Segment 2 has been prioritized fourth (out of 10) for "Major Reconstruction" (MR) in the parkwide road improvement program. Seasonal ADT is 3,430 vehicles, twelfth in volume of the 14 segments.

Segment 3: Mammoth Hot Springs to North Entrance (4.8 miles). Segment 3 parallels the Gardner River, passes under a historic stone arch and ends at the north entrance — the third-most used park entrance. Just beyond the park boundary at the confluence of the Gardner and Yellowstone Rivers is the gateway town of Gardner, Montana, which offers a full range of visitor services. The Mammoth Campground lies along this segment immediately below park headquarters at Mammoth Hot Springs.

Portions of the park were significantly changed by fire in 1988.

Segment 3 crosses one of the driest areas of the park, with fewer than 12 inches of precipitation a year. A grassland / juniper vegetation is dominant. The northern latitude and the 5,000-foot elevation create a cold desert environment which nonetheless provides habitat for abundant of wildlife. A substantial northern Yellowstone elk herd, deer, moose, pronghorn antelope, and bighorn sheep inhabit the area.

The Gardner River has abundant brook, brown, and rainbow trout, which are introduced species; they have mostly replaced the native cutthroat trout and graylings. Golden and bald eagles frequent cottonwoods along the river. With few exceptions, much of the roadway and parking lots do not have defined curb edges, which may subject the adjacent areas to potential drainage and runoff impacts.

Segment 3 is fifth on the MR priority list. Seasonal ADT is 3,160 vehicles, thirteenth in volume of the 14 segments.

Segment 4: Mammoth Hot Springs to Tower Junction (18.5 miles). Segment 4 crosses the Gardner River, follows Lava Creek for a short distance, and then rises up and over the Blacktail Deer Plateau. It generally follows the broad course of the Yellowstone River Valley. About 9 miles from Mammoth Hot Springs, a one-way loop road leaves the highway and takes drivers onto the plateau. Segment 4 connects Mammoth Hot Springs with lodging facilities, a store, and a service station at Tower Junction.

The Yellowstone Valley and the Lamar Valley to the east (segment 5) form one of the largest open expanses in the Yellowstone ecosystem, commonly referred to as the Northern Range. The dry grassland/juniper vegetation type of the Mammoth Hot Springs/Gardiner area in the west changes gradually to Douglas-fir on moister slopes to the east, with spruce mostly along the stream banks. Patches of Douglas- fir forests along the road were heavily burned by the 1988 fires. Mule deer, pronghorn antelope, and elk are prominent in this area of the park. Small lakes along the road usually have abundant ducks, coots, and yellow-headed blackbirds during spring. Undine Falls, Wraith Falls and a short road to fossilized trees flank the roadway.

This segment does not parallel riparian areas for long distances and is generally in less sensitive resource areas. Segment 4 has a sixth MR priority. Seasonal ADT is 3,750 vehicles, eleventh in volume of the 14 segments.

Segment 5: Tower Junction to Northeast Entrance Station (32.7 miles). Segment 5 closely follows the course of the Lamar River and Soda Butte Creek. The roadway splits the spectacular Lamar Valley and then climbs nearly 1,000 feet out of the park as it travels Ice Box Canyon, carved through the Absaroka Mountains by Soda Butte Creek. The Pebble Creek and Slough Creek campgrounds, and the Lamar Valley Ranger Station and Yellowstone Institute, are along this road.

This segment, the longest of the 14 segments, ends at the northeast entrance station, the least-used of the five park entrances. The towns of Silver Gate and Cooke City, Montana, just beyond the northeast entrance, offer a full range of visitor services. The Lamar Valley is one of the more remote areas of the park, spreading fifteen miles in length and three to five miles in width. It supports abundant wildlife populations, especially bison and elk.

Pronghorn Antelope are abundant in certain areas of the park.

Soda Butte Creek, named after an inactive thermal feature, is marked by grasses, sedges, sagebrush, rabbit-brush, and many colorful spring wildflowers. The road crosses and runs parallel to Lamar River and Soda Butte Creek but runs most often along the edge of the valley, a distance away from riparian areas and critical valley bottom habitat. The greatest potential for wildlife disturbance is in the forested, more confined valley of Soda Butte Creek.

Segment 5 has a seventh MR priority and a fifth 3R priority. Seasonal ADT is 3,040 vehicles, the lowest of the 14 segments.

Segment 6: Tower Junction to Canyon Village (18.2 miles). Segment 6 follows the route of the Yellowstone River northeast from the Grand Canyon of the Yellowstone, across Dunraven Pass, and along the north and west flanks of Mount Washburn — an ancient volcano. The Chittenden Road, nearly ten miles north of Canyon Village, affords vehicle access part of the way up Mount Washburn to hiking areas that provide a panoramic view of the Grand Canyon and other areas of the park. There are two picnic areas along the road in the first 2- 1/2 miles from Canyon Village.

Tower Falls, about 16 miles north of Canyon, offers a 32-site campground, a general store, and hiking trails. The road segment ends at Tower Junction, site of the Roosevelt cabins, a restaurant, a general store, horse corrals, and a service station. Segment 6 has a diverse population of animals, including moose, deer, grizzly bear, elk, bighorn sheep (especially on the slopes of Mount Washburn), and a wide variety of vegetation, including species characteristic of alpine tundra. A number of informal pullouts along either side of the road provide excellent views down into adjacent valleys. Generally, the roadway surface is in poor shape, resulting in slow average speeds. The roadway width is insufficient for safe use by bicycles and sight distances are limited.

Segment 6 has a ninth MR priority and a third 3R priority. Seasonal ADT is 4,000 vehicles, tenth in volume of the 14 segments.

Segment 7: Canyon Village to Fishing Bridge (15.7 miles). Segment 7 closely follows the Yellowstone River through the Hayden Valley, one of the most significant habitat areas in the park. West of the Hayden Valley, the road rises and crosses the Central Plateau, which separates the Hayden Valley from the Firehole River valley. The road ends at Lake Junction, with access to the Lake developed area and the east entrance road. Except for two picnic areas and parking for thermal features, there are no developed features along segment 7, providing an unspoiled setting.

Numerous informal pullouts provide convenient access to the Yellowstone River, a favored fishing site. The river is closed to fishing for 6 miles in the heart of the valley. Abundant wildlife — especially bison — is easily visible from vehicles along the roadway. Grizzly bears populate the valley in relatively large numbers, along with a large variety of birds. The Sulphur Cauldron and Mud Volcano thermal areas, approximately 10 miles south of Canyon, are especially active thermal areas and attract large crowds. Because of the proximity of the roadway to the Yellowstone River, conflicts between vehicles and wildlife are common.

Segment 7 has an eighth MR priority and a sixth 3R priority. Seasonal ADT is 6,210 vehicles, third in volume of the 14 segments.

Segment 8: Fishing Bridge to East Entrance (25.4 miles). Segment 8 leaves Fishing Bridge, crosses the Pelican Valley, follows the northern edge of Yellowstone Lake, crosses Sylvan Pass in the Absaroka Range, and descends along the eastern edge of the Yellowstone Plateau to the eastern border of the park. The road provides access to Cody, Wyoming, 53 miles to the east.

Hamilton General Store is at Fishing Bridge.

The Fishing Bridge developed area is the site of an RV park, general store, a gas station, and visitor center. Fishing Bridge itself, a highway crossing over a trout spawning area of the Yellowstone River, is now closed to fishing. The Fishing Bridge area provides important grizzly bear habitat. In recent years, tourist cabins and a campground have been removed from the area to restore natural habitat. A picnic area at Sylvan Lake, with access to Yellowstone Lake is along the roadway east of Fishing Bridge.

Segment 8 has a first ("1B") MR priority. The first phase of construction was funded in 1993. Seasonal ADT is 5,680, fifth in volume of the 14 segments.

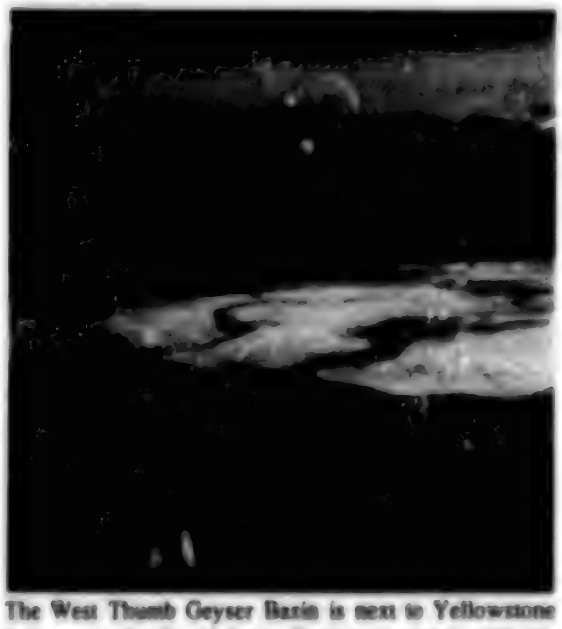
Segment 9: Fishing Bridge to West Thumb (20.0 miles). Segment 9 traces a course along the western shore of Yellowstone Lake, closely following the lakeshore until it ends at the West Thumb intersection. Turnoffs to the Bridge Bay and Lake developed areas are located near the junction. Bridge Bay is the site of a marina, campground, amphitheater, ranger station, and general store. Boat tours of Yellowstone Lake, offered by TWRS, leave from Bridge Bay. The Lake area has lodging and dining facilities, a post office, ranger station, a general store, and the park hospital. The service station/auto repair facility at Fishing Bridge is planned to be relocated to Lake.

Lodgepole pine stands are dense in this unburned area of the park and numerous tributary streams provide excellent moose habitat. Elk and bison are often seen along the roadway, which provides excellent views and access to Yellowstone Lake. Erosion into the lake is a concern where the road parallels the shore. Elsewhere, dense forest conditions and a curving roadway contribute to reduced average speeds. A portion between Arnica Creek and West Thumb has a first ("1A") MR priority. Improvements have been completed on a portion between Fishing Bridge and Lake Junction.

A portion of segment 9 between the Lake area turnoff and Arnica Creek has a first 3R priority. Seasonal ADT is 5,610, sixth in volume of the 14 segments.

Segment 10: West Thumb to South Entrance (and continuation to Moran Junction, Grand Teton National Park), (48.9 miles). Segment 10 begins at the West Thumb Geyser Basin, a thermal area on the shore of Yellowstone Lake. Facilities at West Thumb include a picnic area and trails through the geyser basin. Grant Village is just south of West Thumb and offers a full range of visitor services. The roadway extends south through lodgepole pine forests, some of which display the effects of the 1988 fires. At Lewis Lake, about 10 miles from West Thumb, the road follows the eastern shore, then passes Lewis Falls, parallels the Lewis River, and traverses the Lewis River canyon. The drainage basins alongside the roadway provide wetlands and prime moose habitat.

A short distance before the south entrance, the road begins to follow the Snake River drainage, exits the park, and becomes the John D. Rockefeller, Jr. Memorial Parkway. The parkway encompasses 24,000 acres between Yellowstone and Grand Teton National Parks and is also a roadway through Grand Teton National Park. It provides access to Huckleberry Hot Springs and Flagg Ranch, both offering a full range of visitor services, and the Snake River Campground.



The West Thumb Geyser Basin is next to Yellowstone Lake, near the Grand Loop Road intersection with the south entrance road.

About 10 miles south of Yellowstone's south entrance, after entering Grand Teton National Park, the road begins to follow the shore of Jackson Lake. A picnic ground, the Leeks Marina, and Colter Bay Village are all on or near the lake shore and are reached by the parkway. Near the turnoff to Colter Bay, about 18 miles south of the south entrance, the road angles east away from the lake and then south toward the Jackson Lake junction and The Jackson Lake Lodge, which offers a full range of visitor services. Moran Junction, with a ranger station and post office, is at the end of this segment, approximately 49 miles from West Thumb Geyser Basin.

A 3R project was undertaken on the south entrance road during the mid 1980's. Segment 10 (the portion through Yellowstone) has a tenth MR priority and a seventh 3R priority. Improvements have been completed on a portion between West Thumb and Grant Village. Seasonal ADT is 5,160, eighth in volume of the 14 segments.

Segment 11: West Thumb to Old Faithful (17.8 miles). Segment 11 climbs to the west from West Thumb to the Craig Pass crossing of the Continental Divide at over 8,000 feet. The road travels through lodgepole pine forests that have recently experienced fire and insect infestation. Aside from a few picnic areas and viewpoints, there are relatively few visitor attractions along the roadway and no developed areas offer visitor services. Elk and bison are frequently seen along the roadway. Both species winter here near thermal areas and open water. Kepler Cascades is visible along the southern edge of the roadway shortly before reaching Old Faithful. Segment 11 had a first MR priority and reconstruction was completed in 1989. Seasonal ADT is 7,390, first in volume of the fourteen segments.

Segment 12: Old Faithful to Madison Junction (16.6 miles). Segment 12 follows the banks of the Firehole River and passes through forests severely burned in the 1988 fires. Near Madison Junction a one-way road enters from the Madison side and takes visitors through Firehole Canyon, along a former section of the Grand Loop Road. From Nez Perce Creek to Old Faithful, this segment contains six major geyser features: Lower Geyser Basin, Fountain Paint Pots, Midway Geyser Basin, Biscuit Basin, Black Sand Basin, and Upper Geyser Basin (including Old Faithful Geyser). More than 300 geysers and some 10,000 other thermal features are found along or near this road segment — more than the combined total in all other locations around the world. Perhaps as a result of the extent of thermal features, there are numerous informal parking areas along the road.

Old Faithful is the most popular area of the park (although not the most congested); according to one survey, 84% of all park visitors go to Old Faithful. A wide variety of visitor services is available. One of the park's best known cultural resources, the venerable Old Faithful Inn attracts thousands of guests and visitors each year. In recent years Old Faithful has also become a popular winter season attraction. Thermal areas attract large mammals, especially in winter when elk and bison feed near steamy hot springs. The Old Faithful area roads, though considered confusing to visitors, appear to adequately handle visitor volumes.

The condition of this road segment is generally poor. Segment 12 has a second MR priority and has not been prioritized for 3R. Seasonal ADT is 6,310, second in volume of the 14 segments.

Segment 13: Madison Junction to West Entrance (13.7 miles). Segment 13 begins at the junction of the Firehole and Gibbon Rivers and follows the Madison River — a historic pathway into the park as well as a world-class trout fishing stream — to the west entrance. The Madison campground and nearby museum are the only visitor facilities along the segment. The first half of the road travels through Madison Canyon with National Park Mountain and Mounts Haynes and Jackson flanking the road. The second half offers access to the river via numerous informal pull outs and drives, including the one-way Madison River loop drive.

The road passes through lodgepole pine forests that have recently experienced fire and insect infestation; some burned areas are noticeably charred. The clear Madison River contains several varieties of trout, including rainbow, brown, lake, and brook, and offers outstanding proximity to elk, deer, bison, and trumpeter swans. Winter visitors are rewarded with

The Old Faithful Inn attracts thousands of guests and visitors each year.

frequent animal concentrations attracted by nearby thermal areas. Roadway issues include the sensitivity of fish to potential erosion and sedimentation damage from transportation improvements.

Segment 13 has not been prioritized for MR. It was prioritized second for 3R, and these improvements have been completed. Seasonal ADT is 6,060, fourth in volume of the 14 segments.

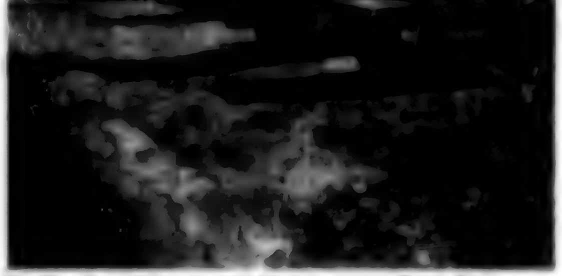
Segment 14: Madison Junction to Norris Geyser Basin (13.7 miles). Segment 14 passes through scenic mountain meadows, following the Gibbon River and passing through Gibbon Canyon en route to the river's confluence with the Madison River. A portion of the road follows the rim of the Yellowstone Caldera, an ancient volcano. The road passes cliff formations and Gibbon Falls, which tumbles over the rim of the caldera. Thermal areas attract animals and the Gibbon River contains rainbow trout. The falls, Gibbon Geyser Basin, and Monument Geyser Basin are principal visitor attractions.

The 1988 wildfires burned intensely along this segment, leading to denuded hillsides, natural landslides and new and expanded view corridors. Some hills and ridges have become visible for the first time in hundreds of years. Segment 14 is narrow and winding in some places, especially at the notorious Tanker Curve about 7 miles south of Norris. A 1986 traffic safety study identified Tanker Curve, site of a serious tanker truck accident, as the roadway location with the highest number of accidents. Madison Junction, at the end of segment 14, had the second-highest number of accidents.

Segment 14 has not been prioritized for 3R and has a third MR priority. Seasonal ADT is 5,480, seventh in volume of the 14 segments.

PARKING FACILITIES

All of the principal parking areas throughout the park, including multiple parking lots at developed areas and individual parking lots at features along park roadways, were inventoried during this study. These lots are shown on the Parking Lot Locations map. The eight principal developed areas of the park offer approximately 5,500 parking spaces, as shown in table 11; other parking lots, listed in table 12, offer approximately 950 parking spaces, for a parkwide total of approximately 6,450 spaces. This total does not include parking spaces in smaller pullouts, loop drives, picnic areas, or other visitor areas along park roadways, which are listed separately in appendix A, "Record of Roadway Features and Parking Facilities". In many cases, the formal



Trailhead parking is provided at Artist Paint Pots.

Table 11: Parking Capacity in Developed Areas

Area	Capacity
Old Faithful	1,437
Grant Village/W. Thumb	882
Canyon Village	337
Canyon North Rim	393
Canyon South Rim	298
Lake	498
Fishing Bridge	555
Bridge Bay	325
Mammoth	476
Tower Roosevelt	183
Total	5,502

Source: Inventory by BRW, Inc., August, 1992

Table 12: Parking Capacity at Major Features

Location	Capacity
Mud Volcano/Sulphur Caldron	158
Norris Geyser Basin	210
Fountain Paint Pots Trail	95
Midway Geyser Basin	60
Biscuit Basin	54
Black Sand Basin	27
Great Fountain Geyser	13
White Dome Geyser	15
Firehole Lake	25
Petrified Tree	15
Mt. Washburn Trailhead	80
Rd. Seg. 1 (North Entrance Rd.)	
- Gardiner River Access East	18
- Gardiner River Access West	20
Kepler Cascades	27
Lone Star Trailhead	22
Delacy Creek Trailhead	25
Shoshone Point	16
Madison Junction Explorers Museum	58
Museum of the National Park Ranger	18
Total	954

Source: Inventory by BRW, Inc., August, 1992 parking lots are not striped and parking capacity is estimated from visitor use. Since many of these lots are not striped, the functional capacity is probably lower than the design capacity.

TRANSPORTATION SERVICES

The majority (94%) of vehicles enter Yellowstone between March and November. During this period, transportation in the park is characterized by a heavy reliance on personal vehicles. During the winter season (December to March) use shifts to snowmobiles and snow coaches, because most park roads are closed to wheeled vehicles. About 90% of vehicles entering the park in the last three years have been either automobiles or RVs. During the peak season Yellowstone, like most national parks, has very few restrictions on where visitors may drive (on paved roads). Consequently, the majority of visitors drive their own vehicles to park features. The large size of the park, the overwhelming popularity of frontcountry activities (e.g., photography, wildlife viewing, and pleasure walking), and the large number of family groups visiting the park, all combine to favor personal transportation.

Concessioner Park Tours

Transportation options other than private vehicles are limited in Yellowstone. Hitchhiking is an option, especially for park employees who lack personal transportation. Bicycling has been increasing in the park but is somewhat hampered by the poor condition and narrow widths of park roads. These factors combine to create potentially hazardous conditions for cyclists and drivers.

The principal alternatives to personal vehicles are bus tours offered by TWRS. These tours are shown on the Bus Tours map. The concession company's 41 tour buses provide access to the entire park and offer connections to and between all of the developed areas. As shown in table 13, five routes are covered: a parkwide tour originating and ending in Gardiner, Montana; the lower Grand Loop (two different tours); the upper Grand Loop; and two different point-to-point routes (between Tower-Roosevelt and Canyon, and between Tower-Roosevelt and Mammoth Hot Springs).

Almost 7,000 visitors took bus tours of Yellowstone in 1992. A breakdown of this total is provided in table 14. The two lower Grand Loop tours offering access to Old Faithful, Grant Village, Fishing Bridge, and Canyon Village are the most popular, serving between 1,800 and 2,400 riders in 1992. The upper Grand Loop tour offering access to Lake, Fishing Bridge, Canyon Village, Tower-Roosevelt, and Mammoth Hot Springs, and the parkwide tour each attracted about 1,300 riders in 1992. The tours range in length from 100

Table 13: Bus Tours Offered by TW Recreational Services

Origin	Intermediate Stops		Return	Tour Time	Route Location/Type
Old Faithful	Grant Village		Old Faithful	9am-6:45pm	Lower Loop
Canyon Village	Fishing Bridge RV	Lake Y. Hotel	Canyon Village	8am-6:15pm	Lower Loop
Lake Hotel	Fishing Bridge RV	Canyon Village	Lake Y. Hotel	8:30am-3:45pm	Upper Loop
Gardiner, MT	Mammoth Hot Spgs.		Gardiner, Montana	8:30am-6pm	Park-wide
Mammoth	Roosevelt Lodge		Canyon Village	1:30pm-3:45pm	Point-to-point
Canyon Village	Roosevelt Lodge		Mammoth Spgs	4:15pm-6pm	Point-to-point

Source: TW Recreational Services, August, 1992.

Table 14: TW Recreational Services
Bus Tour Passenger Totals, Summer, 1992

Bus Tour/Park Area Served	Month of Service	Total Passengers Per Month	Avg. Daily Passengers	Peak Daily Total	Low Total
Old Faithful/Grant Village Lower Loop Tour	May	112	9	13	2
	June	391	13	25	2
	July	544	17	34	5
	August	479	15	34	4
	September	307	11	33	2
Sub Total		1,833^a	14^b	34^c	2^d
Canyon/Fishing Bridge/Lake Lower Loop Tour	May	121	9	28	0
	June	565	18	47	2
	July	745	24	53	4
	August	785	25	56	10
	September	295	11	30	2
Sub Total		2,388^a	18^b	56^c	2^d
Lake/Fishing Bridge/Canyon Upper Loop Tour	(no May runs)	582	12	37	4
	June	612	14	33	0
	July	500	16	42	2
	August	52	8	18	2
	September				
Sub Total		1,366^a	14^b	42^c	0^d
Gardiner/Mammoth Hot Springs and return to Gardiner (Grand Loop tour)	May	60	6	12	2
	June	343	11	30	0
	July	403	13	27	2
	August	577	12	27	2
	September	138	7	12	0
Sub Total		1,321^a	11^b	30^c	0^d
Grand Total		6,908^a	52^b	56^c	0^d

Source: TW Recreational Services, October 1992

a Total passengers per season

b Average daily passengers, typical summer (peak season) day

c Highest peak total

d Lowest low total

to 150 miles, and the bus drivers provide interpretation of the park along the way. These park bus tours are intended by TWRS to serve the interpretive needs (more so than the transportation needs) of park visitors. However, there is some shuttle service between developed areas and lodging facilities. Point-to-point service links Mammoth Hot Springs, Roosevelt Lodge, and Canyon Village. An early-afternoon bus departs Mammoth Hot Springs and a late-afternoon bus departs Canyon Village, with a brief stop at Roosevelt Lodge. Travel time is about 2 hours and 15 minutes between Canyon Village and Mammoth Hot Springs.

The number of tour bus passengers has declined in recent years, according to TWRS. TWRS is evaluating the feasibility of acquiring new tour buses, of smaller size and lighter weight with about 25-passenger capacity and low floors. Their experimental use in 1992 suggested that this smaller capacity vehicle tends to limit load flexibility and results in additional operating costs, since an additional bus and driver must be used when the single-bus capacity is exceeded.

A future source of bus tours may be the gateway communities outside the park, especially West Yellowstone. Visitation to West Yellowstone has increased dramatically, especially during the winter season, as the town has built up its reputation as the "Snowmobile Capital of the World." Undoubtedly, more visitors will be entering the park through West Yellowstone. The town, with the addition of the Grizzly Park development, has the potential to serve as a principal staging area for tours of the park.

At present, no commercial tours of Yellowstone originate in West Yellowstone. However, three private, out-of park companies -- Karst Stage Lines of Bozeman, Montana, Holiday Tour and Travel of Jackson, Wyoming; and Power River Transportation Services of Cody, Wyoming -- provide transportation services in the park under commercial use licenses. Karst Stage Lines operated 122 trips in the park in 1991-1992 and served over 3,500 visitors. Powder River Transportation Services operated 107 trips in 1991 and served 856 visitors. Powder River Transportation services operates between mid-May and mid-September. It departs Cody, Wyoming in the morning, with stops at Pahaska Teepee (outside the park), Lake Hotel, Old Faithful, Canyon Junction, and returns to Cody in the evening. Summary totals of all bus passengers for 1990 and 1991 show that approximately 90,000-100,000 visitors entered Yellowstone in buses, equalling approximately 3.4% of all park visitors.

West Yellowstone has the potential to serve as a principal staging area for tours of the park.

Transportation companies operating on the John D. Rockefeller, Jr. Memorial Parkway are the Grand Teton Lodge Company, and Grayline of Yellowstone. Shuttle services provided by the Grand Teton Lodge Company include connections between Jackson Lake Lodge, Colter Bay Village, Jenny Lake Lodge, Jackson Hole Airport, and Jackson, Wyoming. Yellowstone Park tours are also available from Jackson Lake Lodge and Jackson, Wyoming.

The Grand Teton Lodge Company provides shuttle service between Jackson Lake and Colter Bay Village.

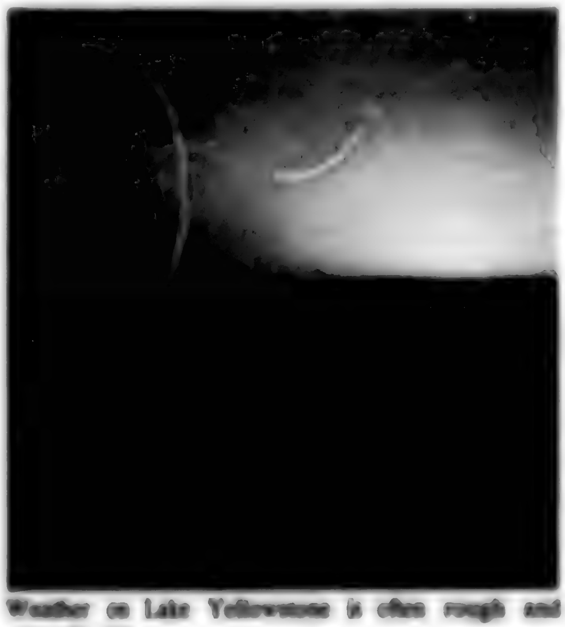
Other Park Tours

TWRS operates boat tours on Yellowstone Lake from Bridge Bay, using a 47-passenger boat. The tours are a one-hour interpreted ride and up to eight per day are offered during peak summer season. In 1992 TWRS carried 15,000 passengers. Demand has been fairly consistent from year to year. A passenger breakdown by month is provided in table 15. The company plans to purchase a new boat soon.

Summer afternoon weather on Yellowstone Lake is often rough and unpredictable. This tends to limit the amount of cross-lake travel and forces restrictions on the operations of rental and private boats. Table 16, located on page 43, summarizes the most current fares for tour services available form TWRS. Tour rates remain in effect until requested changes are approved by the National Park Service.

Snow coaches provide wintertime travel between several points, including: Mammoth Hot Springs and Old Faithful Snow Lodge, Old Faithful and Flagg Ranch, Old Faithful and Canyon, and Mammoth Hot Springs and Canyon. One-way service is offered between all of these destinations.

Usually a morning snow coach travels between two destinations and an afternoon snowcoach will return to the original destination. Round-trip tours are offered between Old Faithful, Canyon, and Mammoth Hot Springs. Winter season visitors and snowcoach passengers are accommodated in two lodging facilities operated by TWRS, the Old Faithful Snow Lodge and the Mammoth Hot Springs Hotel. During 1991-92, TWRS carried nearly 16,000 visitors in its snow coaches. A breakdown of this total is presented in table 17. Winter season visitors also travel into Yellowstone from Flagg Ranch, several miles south of the park along the parkway. In 1991-92, 11 companies offered snowmobile tours of Yellowstone from Flagg Ranch. Nearly 14,000 visitors entered Yellowstone in this manner. During the winter season, wheeled vehicles can reach Flagg Ranch from the south. Snowmobile tours also originate from Mammoth, West Yellowstone, and the east entrance. West Yellowstone accommodates the highest number of combined private and tour-operated snowmobile trips.



Weather on Lake Yellowstone is often rough and unpredictable.

Table 15: TW Recreational Services Boat Trips on Yellowstone Lake, 1992

Month	Passengers	Trips	Avg. Daily Passengers	Average Passengers Per Trip	Average Daily Trips	Peak Totals[a]	Average Low Totals[b]
June	2,678	98	89	27	3	248 pass. 7 trips	12 pass. 3 trips
July	5,700	198	183	28	6	262 pass. 7 trips	71 pass. 3 trips
August	5,725	164	184	34	5	303 pass. 7 trips	52 pass. 2 trips
Sept.	956	64	47	14	124 pass.	9 pass 5 trips	1 trip
Total	15,059	524	134	28	4		

Source: TW Recreational Services, October, 1992

[a] Peak daily totals for month indicated

[b] Low daily totals for month indicated

Table 16: TW Recreational Services Bus and Boat Tour 1991 Fares

Route	Origination Point	Adult Rate	Child Rate
Lower Loop	Old Faithful	$24.15	$12.08
	Grant Village	24.15	12.08
	Canyon Village	23.69	11.85
	Fishing Bridge	23.69	11.85
	Lake Hotel	24.15	12.08
Upper Loop	Lake Hotel	22.05	11.03
	Fishing Bridge	21.63	10.82
	Canyon Village	16.48	8.24
Grand Loop	Gardiner	25.00	12.50
	Mammoth	23.69	11.85
Mammoth-Roosevelt-Canyon	Either End	9.53	4.79
Mammoth-Roosevelt	Either End	4.64	2.32
Roosevelt-Canyon	Either End	4.89	2.47
Scenicruiser One-Hour Lake Cruise	Bridge Bay	6.50	3.50

Source: TW Recreational Services

Note: Bus tour costs are gross costs and include taxes; boat tour costs do not include taxes but are subject to county, state and federal taxes.

Table 17: TW Recreational Services
Snow Coach Passenger Totals, 1991-1992

Route	December	January	February	March	Total	Average Daily Total	Peak	Low
Mammoth Hot Springs - Old Faithful Snow Lodge	475	991	891	23	2,380	31	60	0
Old Faithful. Snow Lodge - Mammoth Hot Springs	504	714	741	17	1,976	26	65	0
West Yellowstone - Old Faithful Snow Lodge	703	889	1,142	382	3,116	37	99	4
Old Faithful Snow Lodge - West Yellowstone	717	839	979	458	2,963	36	100	0
Old Faithful Snow Lodge - Flagg Ranch	265	806	690	332	2,093	26	66	0
Flag Ranch - Old Faithful Snow Lodge	372	796	808	218	2,194	27	71	6
Old Faithful - Canyon Village	75	192	195	33	495	6	16	0
Mammoth Hot Springs - Canyon Village	134	232	207	0	573	8	23	0
Total	3,245	5,459	5,653	1,463	15,820	191	100	0

Source: TW Recreational Services, August 1992

TRANSPORTATION CONDITIONS

For the last twenty years and certainly earlier, Yellowstone National Park administrators and planners have addressed transportation issues and the state of travel conditions in the park:

- In the park's 1974 *Master Plan* traffic congestion was noted, and a recommendation made that some "form of mass transportation system must be introduced" to the park. "The existing traffic problem results from the fact that the visitor must utilize his private automobile to see the park," stated the *Master Plan*.

- A 1979 regional transportation study proposed that a "mandatory bus-oriented transportation system" be implemented. Under this system, private vehicle traffic would be banned, except for the cars of overnight visitors and through traffic, and parking lots would be utilized as staging areas. The need for regulations to implement this transportation system was noted, along with its "considerable social impacts". An alternative proposal would have made bus transportation optional, with the stated recognition that "few bus passengers would be anticipated [and] this alternative would probably not significantly reduce traffic volumes." Ultimately, the 1979 study concluded that "the existing transportation system has the capacity to meet future needs, with minor improvements to relieve congestion."

- The draft *Parkwide Road Improvement Plan/Environmental Assessment* released for public review in February, *1992)* cited the 1979 study conclusion to "evaluate alternatives that retain the existing road network in its present configuration."

Traffic on Yellowstone's roadways has increased while funding for maintenance and renovation has decreased in recent years.

The final *Parkwide Road Improvement Plan*, completed in the summer of 1992, calls for measures to preserve and extend the service life of principal park roads in Yellowstone and to enhance their safety. The plan calls for a long-term program of road improvements consisting of MR projects for severely deteriorated roadway segments and 3R projects to improve the condition and extend the life of other road segments in Yellowstone. The Road Improvement Program map indicates the designation and priority schedule of combined road project types as determined by the Federal Highway Administration in cooperation with the National Park Service. Project start dates and the duration of individual projects will depend on Federal Lands Highway Program funding and construction conditions such as weather, existing physical roadway conditions, resource issues, and traffic management.

The Grand Loop Road connects all of the developed areas of the park and provides access to the majority of the natural features. According to travel time surveys conducted by BRW, Inc., in August, 1992, a complete circuit of the Grand Loop Road, beginning and ending at the west entrance, can take approximately 4 1/4 hours by private vehicle. Travel times on individual segments, which are shown on the Point-to-point Travel Time map, typically take from 20 minutes to one half hour. These travel times are often lengthened during the peak season, when traffic volumes increase and animal viewing halts traffic on roadways.

Traffic Volumes

Daily traffic volumes for the park are provided on the Year 1992 Average Daily Traffic map. In the vicinity of Old Faithful and Yellowstone Lake (segments 7, 8, 9, 11, 12, and 13) seasonal average daily traffic (SADT) counts are higher than in the vicinity of Mammoth Hot Springs, Tower Junction, and the northeast entrance. Old Faithful is by far the most popular attraction in the park, followed by Canyon, Grant Village/West Thumb, and Norris Geyser Basin. Although not identified in surveys of visitor use, the Hayden Valley is also a popular attraction, with the road through the valley having one of the park's highest SADT. In general, traffic volumes on the lower half of the Grand Loop Road are higher than the upper half. The three busiest park entrance roads (west, south, and east) lead to the lower portion of the Grand Loop Road.

Vehicle Classification

A vehicle classification survey conducted in 1992 found that over 85% of all vehicles entering the park were passenger cars, pickups and vans. The results of the complete survey are shown in table 18, located on page 50. Similar totals provided by the National Park Service show that 80% of vehicles entering the park in 1991 were passenger cars, pickups, and vans.

Parking Use

Parking occupancy samples were taken at major visitor activity locations from Wednesday, August 12, 1992, through Monday, August 17, 1992. The samples were recorded at various times throughout the day between the hours of 9:00 a.m. and 6:00 p.m. Average and maximum occupancy findings for specific locations are presented in table 19, located on page 51. Appendix C, "Parking Lot Occupancy Count Raw Data" and appendix D, "Parking Lot Occupancy Count Summaries" summarize the actual counts taken at each location along with their respective sample times and dates.

The adequacy of the parking facilities at the developed areas varies widely. Old Faithful has at least 1,475 parking spaces and apparently sufficient capacity, despite its great popularity. But Mammoth Hot Springs, a less popular attraction, suffers from traffic congestion and crowded parking lots, in part because the Grand Loop Road passes through the thermal viewing areas and the center of the developed area. Tower Falls is a less popular attraction than Old Faithful, yet its parking area, used jointly by falls visitors and Hamilton Store patrons, is very crowded, requiring visitors to park along the roadway. Parking capacity at Lake, Fishing Bridge, Grant Village, and Canyon was observed to be adequate. Several of the smaller lots along the Canyon north rim (28-48 capacity) were noticeably congested during the middle of the day, while the larger lots of the south rim (50-120) had sufficient capacity. Many of the popular geyser basin attractions, such as Norris, Fountain Paint Pot, Midway, and Biscuit basins typically approached their maximum parking capacity at one or more times during the day.

Transportation has been a prominent issue in Yellowstone for more than two decades.

It has been determined from parking lot turnover surveys that typical visitor stays in most lots are less than one hour. This was true during the sample period at Midway Geyser Basin, Black Sand Basin, Fountain Paint Pots, Canyon Village, and Artist Point. Parking lots with less frequent turnover (typically 55% to 85% hourly) are at Norris Geyser Basin, Biscuit Basin, and Old Faithful. Locations such as Uncle Tom's Trail and parking lots in the Mammoth area exhibited variable turnover rates between sample hours, suggesting that there may be a wider variety of parking durations occurring there. The parkwide variability in turnover rates stems from differences in time necessary to view particular attractions. Certain small thermal areas (e.g.

Table 18: Vehicle Classification Survey

Vehicle Classification	Northeast Gate %	North Gate %	South Gate %	East Gate %	West Gate %	All Gates %
Passenger Car	78.1	68.8	80.2	71.3	71.5	73.7
Pickup	3.9	9.9	4.3	4.2	7.8	6.3
Van	5.8	5.3	6.7	6.7	7.2	6.4
Bus	0.0	1.4	0.8	0.0	0.0	0.6
Camping < 20'[a]	5.2	1.2	0.6	2.5	1.5	1.3
Camping > 20'[b]	0.7	5.1	4.1	11.2	6.3	6.4
Commercial	1.9	6.0	0.6	0.5	2.7	2.4
Other Trailers	1.3	0.5	0.8	2.7	1.5	1.3
Motorcycle	3.2	1.9	1.8	0.8	1.5	1.7
Total Vehicles Surveyed	155	433	490	401	333	1812

Source: BRW, Inc., August 27, 28 & 29, 1992

[a] Truck or van camper, small RV

[b] Large RV, camper trailer, combination of small camping vehicle and trailer with overall length > 20'

Table 19: Parking Occupancy Findings

Visitor Activity Location	Total Parking Spaces	Average Occupied Spaces	Maximum Occupied Spaces
Mammoth Hot Springs			
Post Office	88	40	54
Visitor Center	31	26	28
Food Services	60	47	59
Lower Terrace Complex	96	76	90
Upper Terrace Complex	52	30	41
Hamilton Store	12	11	13
Hotel/Rec. Hall	45	33	43
Residential Area	64	54	55
Chapel	28	0	0
North and South Canyon Rims			
Upper Falls (North)	82	31	42
Uncle Toms Trail (South)	128	43	76
Wapiti Trailhead (South)	50	6	15
Artist Point (South)	120	47	65
Inspiration Point (North)	48	26	35
Grandview Point (North)	35	26	35
Lookout Point (North)	28	18	20
Brink of Lower Falls (North)	100	39	47
Canyon Village			
Visitor Center	447	187	269
Camper Services	55	25	40
Canyon Horse Corral	55	15	15
Grant Village			
Visitor Center	137	39	45
Post Office/Restaurant	115	20	24
Lodge Guest Registration	46	14	14
Hamilton Store Main	114	41	60
Hamilton Store Rear	36	19	20
Hamilton Mini-Store	12	5	5
Lodge Guest Parking South	132	5	6
Lodge Guest Parking North	113	15	18
Camper Services	70	23	37
Campground Entrance	6	3	4
West Thumb			
West Thumb Geyser Basin	101	28	29
Bridge Bay Marina			
Bridge Bay Marina Main	190	132	138
Bridge Bay Marina East	80	15	18
Bridge Bay Marina West	55	26	30

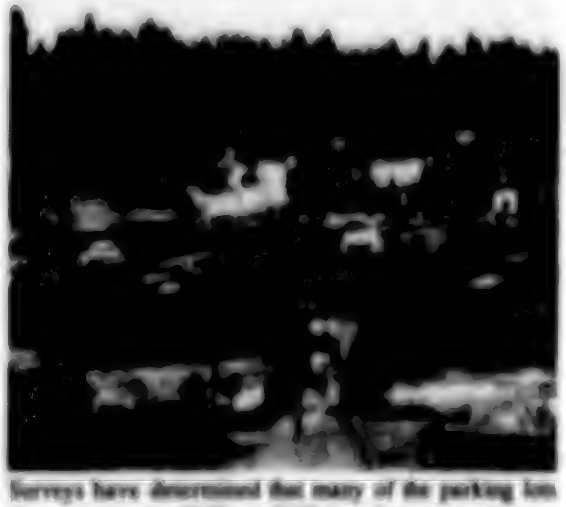
Table 19: Parking Occupancy Findings (continued)

Visitor Activity Location	Total Parking Spaces	Average Occupied Spaces	Maximum Occupied Spaces
Lake Developed Area			
Lake Hotel Rear	108	30	30
Post Office	69	32	32
Hospital Lower	52	25	25
Hospital Upper	15	2	2
Hamilton Store	58	21	21
Lake Lodge	120	43	43
Norris			
Norris Geyser Basin	210	132	197
Old Faithful Development			
West Lot	180	24	30
Visitor Center	104	89	96
Inn (Rear)	7	5	6
East Lot	487	400	434
Southeast Lot	45	36	42
Northeast Lot	102	108	110
Snowlodge North	36	34	34
Snowlodge Front/West	70	52	58
Hamilton Store	21	21	24
Lodge West	80	75	80
Lodge Rear	80	57	70
Inn Main	175	153	167
Hamilton Store/Inn	50	44	49
Road Segment 12 and Firehole Lake Drive			
Fountain Paint Pot Trail	95	62	94
Midway Geyser Basin	60	37	59
Biscuit Basin	54	33	44
Black Sand Basin	27	14	20
Great Fountain Geyser	13	9	14
White Dome Geyser	15	4	8
Firehole Lake	25	8	13
Madison Junction			
Explorers Museum	56	9	15
Tower/Roosevelt, Road Segments 4 and 6			
Petrified Tree	15	10	10
Roosevelt Lodge	30	25	25
Tower Falls/Store Lot	53	70	70
Tower Falls/Store Strip	40	44	44
Service Station	15	9	15
Calcite Springs	30	24	24
Chittended Road, Mt. Washburn Trailhead	80	11	11

Table 19: Parking Occupancy Findings (continued)

Visitor Activity Location	Total Parking Spaces	Average Occupied Spaces	Maximum Occupied Spaces
Road Segment 3			
Kepler Cascades	27	19	20
Lone Star Trailhead	22	16	19
Delacy Creek Trailhead	25	15	20
Shoshone Point	16	3	3
Road Segment 11			
Kepler Cascades	27	19.00	20
Lone Star Trailhead	22	16.50	19
Delacy Creek Trailhead	25	15.00	20
Shoshone Point	16	3.00	3

Source: BRW, Inc., August, 1992



Surveys have determined that many of the parking lots can experience a 90% to 100% hourly turnover rate.

Black Sand Basin), can be viewed in one hour or less. Canyon Village visitors must leave the village to reach the north and south rim drives, thereby reducing the time they spend at Canyon Village. However, Norris Geyser Basin and Old Faithful offer extensive walking trails through thermal areas, which require a longer time commitment. Appendix E, "Parking Supply/Turnover Duration" summarizes the parking turnover findings at each location.

ENVIRONMENTAL CONDITIONS

This overview of environmental issues in Yellowstone National Park summarizes and interprets information derived through published sources, site visits, and discussions with Yellowstone National Park and other NPS personnel. Air, water, geology, soils, vegetation, wildlife, cultural, visual, noise, and climate are addressed.

Yellowstone National Park is internationally recognized for its scenery, wildlife, wilderness, rivers, and geologic and thermal features. The park is bounded by six national forests and the John D. Rockfeller, Jr. Memorial Parkway which is administered by Grand Teton National Park.

Approximately 90% of the park is classified as wilderness. Lands and waters in this classification are characterized by their primitive nature, lack of facilities, and low level of visitor use. The remainder of the park area contains visitor facilities and is traversed by transportation corridors.

Air Quality

Yellowstone National Park is designated as a class I area under the Clean Air Act. This designation provides the highest level of air quality protection for internal and external emissions.

There are currently no major sources of air pollution in the park vicinity; however, the natural thermal resources in the park emit hydrogen sulfide, a noxious gas that can be poisonous in high concentrations. Human-related sources of air pollution include motor vehicles, campfires, wood stoves, boilers for the generation of electricity and steam, and road material processing equipment. Although vehicular traffic on the roadways is one of the larger sources of air pollutants in the park, it is still believed to have a minimal impact on local air quality. Local carbon monoxide levels are well below the national ambient air quality standard of 0.03%.

Water Resources

Yellowstone National Park encompasses a 3,500-square-mile watershed that preserves one of the most significant and near-pristine aquatic environments in the United States. The surface water resources of Yellowstone include 604 streams comprising 3,785 miles of running water, and 175 lakes with a total surface area of 108,000 acres. The headwaters of the Missouri and Columbia Rivers are located along the continental divide in Yellowstone National Park.

Water quality in the park can be affected by both natural processes and human activities.

Water quality in the park has the potential to be affected by both natural processes and human activities. Natural influences include hydrothermal discharge, wildlife, fire, and storm runoff. Data clearly show that many of the lakes and streams in Yellowstone are very weakly buffered against pH lowering that could be induced by the addition of acidic rain or snow melt.

The protection of historic stream flows entering Yellowstone from outside areas rests with State and Federal water quality regulations. These flows, in most cases, have been subject to sufficient control to ensure that park management requirements have been met.

There is potential for pollution of the waterways since many roadways and use areas parallel streams, rivers, and lakeshores. Motor vehicles present a small potential source, and gasoline and construction tank trucks present a greater potential pollution source from accidents or spills. Erosion and sedimentation from road edges into stream courses are a concern primarily in construction zones or where informal parking pulloffs lack edge containment.

Streams and lakes are designated class 1 by the state of Wyoming; therefore, no wastewater discharges are allowed in these park waters. Some of the park's waters may be occasionally degraded by the sewer systems in the park, particularly during power outages.

Geology and Soils

Yellowstone is on a large plateau in the northern Rocky Mountains. Elevations range from 5,200 feet to over 11,000 feet. The park is characterized by broad, forested, volcanic plateaus surrounded by major mountain ranges on the north, south, and east.

The outcome of past geological events has been the deposition of various rock types and surface material in the park. Many of the structural problems of the park road system and the challenges of road building and maintenance are caused by these underlying materials. The park remains geologically active today.

There are significant geologic hazards in Yellowstone, and health and safety may be threatened in nearby areas during facility modifications or new construction. These hazards include rockfalls, mudflows, and slumps near roads, earthquakes (leading to dangerous rockfall), renewed volcanic activity, hydrothermal explosion, and lethal gas accumulations. Frequent small tremors and earthquake swarms, strong enough to be felt or do minor damage, have their epicenters in Yellowstone every year. Maintenance, construction, and other operations must ensure that excavations and blasting near thermal areas are conducted so that potential impacts are mitigated.

The park contains the world's largest and most active geothermal areas. Approximately 120 thermal areas in nine major basins have been identified. These areas include geysers, hot springs, mud pots, and fumaroles. Thermal areas have influenced flora and fauna. The hot water they emit creates microclimates that allow certain plants and insects to remain active and grow throughout the year. Warm ground keeps areas relatively free of snow, enabling the park's elk and bison herds to feed in these areas during winter months. Hot springs flowing into lakes and rivers also keep waters from freezing, increasing winter habitat for waterfowl and bald eagles.

Triggered by seismic activity and interference by man's activities in the park, landslides and related phenomena are a recurring hazard. Future strong seismic activity is certain to cause more damage to Yellowstone's roads, buildings, and utilities. The McMinn Bench between Mammoth Hot Springs and the north entrance has a large slump of sediments moving downhill that threatens to eventually bury the road, possibly catastrophically as a single, rapidly disintegrating unit.

A final geologic hazard in Yellowstone is lethal gas accumulations. Confined mainly to the park's thermal areas, there are occasional concentrations, predominantly of carbon dioxide, that have been fatal to wildlife and humans.

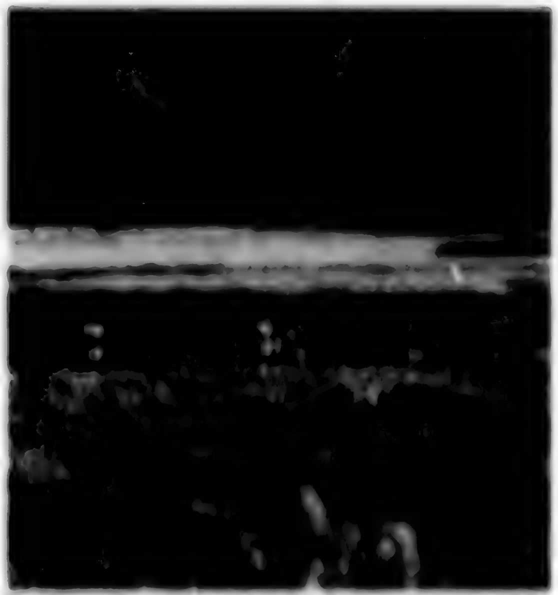
A wide variety of soils occur in Yellowstone from dry, heavy, near-desert soils through fine-to-coarse subalpine soils (both forest and mountain meadow) to alpine soils. Except for some parts of developed areas and a few hundred acres in previously cultivated areas, the park soils are in a pristine condition.

Vegetation

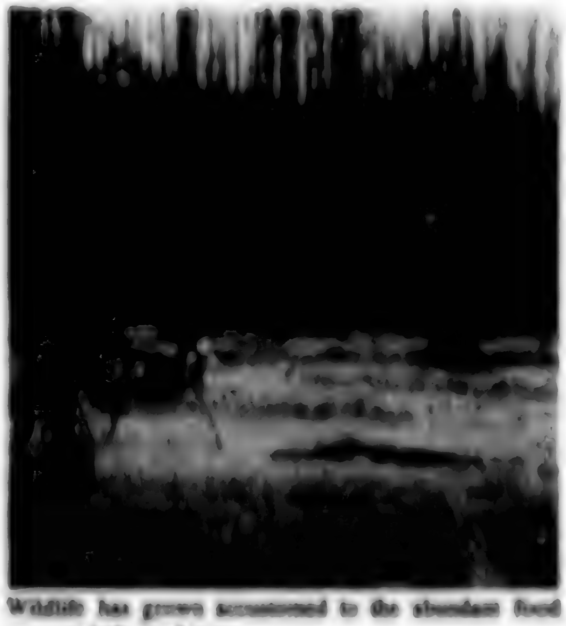
Yellowstone's mountains and high plateaus are generally covered by conifer forests or moist meadows. There are three major forest zones in Yellowstone: the spruce/fir, lodgepole pine, and Douglas-fir. The spruce/fir zone is dominated by forests of Engelmann spruce and subalpine fir, the lodgepole pine zone by dense stands of lodgepole pine, and the Douglas-fir zone by Douglas-fir, with snowberry understory in younger stands. Nonforested meadows and wetlands comprise some of the most critical wildlife habitat in the park.

Thermal areas have influenced flora and fauna.

Wetland communities consist of wet forest, shrubbery riparian, and grassland riparian habitats. Wet forest habitat covers about 8% of the park and is dominated by Englemann spruce and subalpine fir. Shrubbery riparian habitats, found along streams and near seeps, are usually dominated by willows and sedges. Grassland riparian habitats are usually associated with standing water and are most



Nonforested meadow and wetlands comprise some of the most critical wildlife habitat in the park.



Wildlife has grown accustomed to the abundant food sources in burned areas.

often sedge marshes. Riparian wetlands provide year-round wildlife habitat. Any waters remaining ice-free provide important winter habitat for waterfowl, bald eagles, and water-dwelling mammals.

Two plant species — Ross's bentgrass and a sand verbena — are now or soon will be federally listed as category 2 and are protected in the same manner as threatened or endangered species. Ross's bentgrass is found in the Lower Geyser Basin near roads; the sand verbena is found on sand bars at the edges of lakes and streams in the Yellowstone Lake area.

Wildlife

Over sixty species of mammals, hundreds of species of birds, six species of reptiles, four species of amphibians, and many native and introduced species of fish inhabit the park.

Human effects on wildlife vary throughout the year, from the major intrusion of visitors along roads and developed areas in summer to the more dispersed effect of snowmobile users and skiers in winter. The vast majority of visitors stay within close proximity of the road corridors, so wildlife disturbance is most significant at migration route crossings and where use areas are close to roads. Disturbance is common where park roads follow river courses and traverse valley meadows.

The greatest potential for conflict between winter visitors and wildlife is along rivers, in valley bottoms, and in the geyser basins, which provide frequently used wildlife habitat and are also accessible to people by way of snow trails. Bison, elk, and moose travel on groomed and plowed roads to reach feeding areas and thereby reduce the energy needed to move through deep snow.

Four animal species protected by the Endangered Species Act of 1973 are found in the greater Yellowstone area: the bald eagle, the peregrine falcon, the whooping crane, and the grizzly bear. Category 2 species include the wolverine, lynx, Preble's shrew, spotted bat, western big-eared bat, ferruginous hawk, mountain plover, long-billed curlew, burrowing owl, and the Arctic grayling, all of which are rarely recorded in the park. The common loon, osprey, American white pelican, harlequin duck, and Caspian tern are also of special management concern.

Cultural Resources

Although more than 400 archaeological sites have been recorded, comprehensive archeological surveys of less than 1% of the park have been completed. There is a high probability of encountering cultural resources in the area around Gardiner, along the Yellowstone River, and in the area around Obsidian Cliff, which has been nominated as a national historic landmark. The ethnographic record of the park is incomplete and little is known about Native American use or perception of Yellowstone's resources.

Yellowstone cultural resources designated as national historic landmarks include the museums at Norris, Madison Junction, and Fishing Bridge; the Old Faithful Inn; and the northeast entrance station. Resources listed on the National Register of Historic Places include the Old Faithful Historic District, the Mammoth Historic District, the Obsidian Cliff kiosk, the Lamar buffalo ranch, and the Lake fish hatchery district. The Lake Hotel has been determined eligible for listing on the National Register of Historic Places. The Snow Lodge is in the Old Faithful Historic District but is listed as a noncontributing structure.

The Lake Hotel is eligible for listing on the National Register of Historic Places.

In recognition of the significant historic qualities of the Yellowstone road system, a National Register of Historic Places multiple property documentation was submitted in 1991. A number of historic districts have been defined in the multiple property form, including the Grand Loop Road, the five entrance roads, and collector roads. A variety of noteworthy structures and features are included as part of this nomination, including several bridges.

Visual Resources

As one of the premier wildlife viewing units in the national park system, Yellowstone is a major visitor destination for people worldwide. Historically, most visitors have viewed Yellowstone from private vehicles. The majority of park roads are within a landscape setting of significant visual quality. The pristine conditions, the striking geological, thermal, and hydrological features, and the presence and variety of wildlife all contribute to the aesthetic qualities of Yellowstone. Two primary types of views are important — views to natural landscapes and views of wildlife.

An important characteristic of natural landscape views is composition. Significant landscape views are often expansive, including interesting components in the foreground, middle ground, and background. Each of these elements contributes to the overall viewing experience. Landscape views are not static; their components can be observed from numerous vantage points. Significant viewpoints along the road system have been designated with pullouts and interpretative markers. Many of Yellowstone's destination points exist because of special viewing opportunities.

Views of wildlife are unpredictable and difficult to designate by location. Viewing opportunities increase in habitat locations and in major park meadows. The 1988 fires have changed many views and have created new viewing opportunities where dense forest once surrounded roads.

Signage along and within the developed portions of transportation corridors is inconsistent. Materials, colors, sizes, and heights of signs have various and numerous aesthetic vocabularies. Their specific locations have been identified for utilitarian purposes and not necessarily with regard to the adjacent setting or landscape views. Park buildings and

The park contains about 300 miles of roads.

structures are also frequently incompatible with their settings and landscape views.

Noise

Noise impacts can be described in terms of constant and concentrated influences. Personal vehicles and delivery trucks generate the greatest amount of constant noise throughout the park. Large trucks and RVs can be heard from significant distances especially in areas with steeper grades where they operate in lower gears. Automobile contribution to parkwide noise is significantly less.

Concentrated noise is generated by heavy equipment during road maintenance and construction-related activities. Concentrated noise in developed areas is generated by human and transportation system activity. Other noise sources include snowmobiles, snow coaches, snowplows, automobile, and truck traffic and aircraft noise. The timing and location of these noise-generating activities is important with regard to wildlife migration, lambing, calving, rutting, and areas of day-to-day habitat occupation. In some cases wildlife may be habituated to noise from roads or developed areas; in others they may avoid those areas. Unnatural noise levels may also detract from the visitor experience.

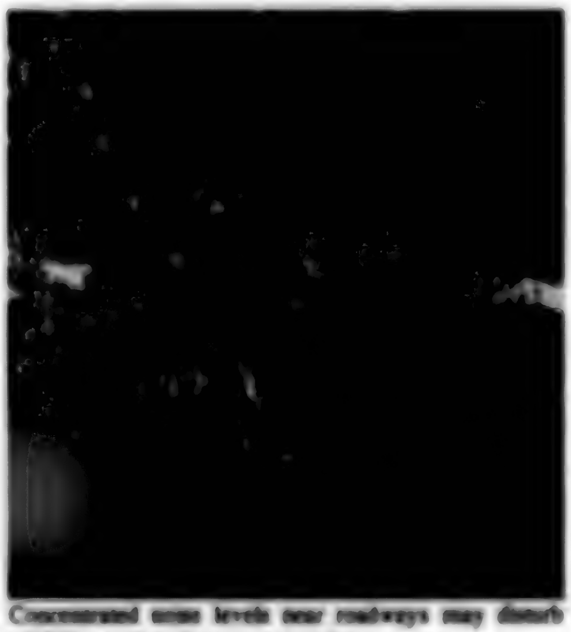
Climate

The park's two climatic types, mountain and valley, are reflected in its vegetation. The valley type is common to large valleys and central plateaus and is similar to that of the Great Plains, with peak precipitation falling as rain in May and June. The mountain type occurs along the continental divide and at higher elevations throughout the park. The mountain climate is characterized by precipitation falling primarily as snow during the winter months.

Winter snows in this region are very light and powdery. Wind and warm temperatures, however, compact the snow into very heavy, dense masses. Avalanche danger can be high.

SUMMARY OF RESOURCE IMPACT ISSUES

The following are the most critical resource issues associated with visitor use and transportation in Yellowstone National Park. Maps at the end of this section illustrate the most important resources.



Concentrated noise levels near roadways may disturb wildlife at migration route crossings.

Air Quality

Yellowstone Park is designated as a class I area under the Clean Air Act. Human-related sources of air pollution include motor vehicles, campfires, fireplaces, wood stoves, boilers for the generation of electricity and steam, and road material processing equipment. These sources have not resulted in significant pollutant levels in the parks air.

Water Resources

There is potential for pollution of waterways since many roadways and use areas parallel streams, rivers, and lakeshores. Motor vehicles present a small potential source. Gasoline and construction tank trucks present greater potential pollution sources from accidents or spills. Erosion and sedimentation from road edges into stream courses are mainly a concern in construction zones or where parking areas and trails do not have edge containment.

Geology and Soils

There are significant geologic hazards in Yellowstone and health and safety may be threatened in nearby areas during facility modification or new construction. Hazards include geothermal areas, rockfalls, mudflows and slumps near roads, earthquakes, renewed volcanic activity, hydrothermal explosions, and lethal gas accumulations. Geologic hazards contribute to increased maintenance requirements and could affect the design requirements for transportation structures.

Habitat

Perhaps the most critical resource impact is that of roadways that traverse important wildlife habitat, both along the park's rivers and near concentrations of geothermal features. The ongoing effects include habitat and wildlife disturbance, road kills, changes to hydrologic processes of rivers and deposition patterns of geothermal features, and increased soil erosion and sedimentation into water courses.

The Yellowstone River through Hayden Valley, the Pelican Creek area, Swan Lake Flats, the Madison River from the west entrance to Madison Junction, and the Lamar River Valley represent some of the most critical meadow, non-forest, and wetland habitat in the park with the highest concentrations and most diverse collection of wildlife species. Other significant wildlife habitats include sheep migration routes between Mt. Everts and Mt. Washburn and vast areas of wetland habitat along the south edge of Yellowstone Lake, which are used by a variety of birds. Impact to category 2 plant species -- Ross's bentgrass and sand verbena - are of concern especially along the margins of Yellowstone Lake.

Wildlife

Of greatest concern are seasonal influences on wildlife from increased visitation in the winter and shoulder seasons. Spring and fall are critical times for species in the Hayden Valley, and for feeding, migrations, calving, and rutting in the Old Faithful/Lower Geyser Basin area. Since most visitors stay close to road corridors, wildlife disturbance is most significant at migration route crossings and where use areas are in proximity to roads. Disturbance is common where park roads are located along river courses and through valley meadows.

Four animal species protected by the Endangered Species Act of 1973 are found in the greater Yellowstone area; the bald eagle, peregrine falcon, whooping crane, and grizzly bear. In addition, there are ten category 2 species and six special management species.

Cultural Resources

Significant archaeological and historic resources exist throughout the park, including those on or nominated to the national register at Norris, Madison Junction, Old Faithful, Fishing Bridge, Lake, Obsidian Cliff, the Lamar buffalo ranch, the northeast entrance station, the Grand Loop Road, and numerous bridges and secondary roads.

Visual Resources

As one of the premier wildlife viewing units in the national park system, Yellowstone is a major visitor destination. The majority of park roads are in a landscape setting of significant visual quality. Signage along park roads is often inconsistent and incompatible with the setting or landscape views. Some park buildings and structures are also incompatible.

Noise

Personal vehicles and delivery trucks generate the greatest amount of constant noise throughout the park. Large trucks and RVs can be heard from significant distances, particularly in areas with steeper grades. Concentrated noise is generated by heavy equipment during road maintenance and construction-related activities. The timing and location of noise is important to wildlife migration, reproduction/rearing, and habitat occupation.

Climate

Winter snows combined with wind and warm temperatures create conditions for dangerous avalanche events.

PARK DEVELOPMENT PLANS

The management of Yellowstone National Park by the National Park Service is guided by a *Master Plan* which was approved in 1974. The *Master Plan* emphasizes the park's status as a legislatively enacted natural area, and it establishes guidelines for the overall use, preservation, management, and development of the park. The document plans for future management activities and proposes ways to minimize visitor impacts and provide quality park experiences. In addition to the *Master Plan*, the *Wilderness Recommendation* was approved in 1972. This recommendation called on Congress to designate over 2 million acres of Yellowstone for inclusion in the national wilderness preservation system. To date, this action is still pending. Nonwilderness areas are designated as a single park development zone and fall into two broad categories — park developed areas and transportation corridors.

Other general planning documents relevant to park transportation issues include a *Winter Use Plan*, approved in 1990, and the final Road Improvement Plan completed in 1992. In preparation are specific planning documents that guide the management of developed areas of the park and such issues as exotic vegetation, bears, and solid waste. A complete listing of these plans is contained in table 20.

Certain developed areas of the park are managed according to development concept plans, (DCPs). These documents evaluate the impact of proposed actions to change, improve, or replace facilities in the developed areas of the park. To date, development concept plans have been approved for Fishing Bridge, Grant Village, Old Faithful, and Lake/Bridge Bay. Development concept plans are pending for Canyon Village, the east entrance, Madison Junction, Mammoth Hot Springs, the northeast entrance, Norris, the south entrance, Tower - Roosevelt, and the west entrance.

The Fishing Bridge plan, approved in 1988, emphasized the importance of the grizzly bear habitat that overlaps this developed area, calling for the removal of most facilities. To date, tourist cabins and a campground have been removed; a 358-site RV park operated by TWRS remains. A gas station/auto repair facility is planned to be relocated to the Lake area. Planning is underway to replace the Fishing Bridge campsites in the Norris area.

The Grant Village plan, approved in 1979, guided the construction of 200 lodging units, 75 dormitory units, a restaurant, a general store, and a guest registration building. This work was completed in 1982. The Grant Village marina is proposed for removal, with restoration of the natural shoreline. No additional work called for by the plan has been undertaken nor is funding in place to support additional work.

The Old Faithful plan, approved in 1985, proposes to reduce development close to thermal features, improve vehicular and pedestrian circulation, improve orientation and information, provide adequate support services, provide appropriate winter use facilities, and improve accessibility for persons with disabilities. Funding for implementation of the plan is still pending.

The Lake/Bridge Bay plan addresses the issues of access, circulation and parking, visitor and administrative facilities, visitor experience, and interpretation.

A draft report of an environmental assessment for employee housing was completed in 1992. This document evaluates the impact of improving employee housing and some support facilities at Canyon Village, the east entrance, Grant Village, Madison Junction, Norris, the northeast entrance, the south entrance, Tower, and the west entrance. The goal of the housing plan is to provide more adequate housing for park employees and improve substandard support facilities such as maintenance facilities, utilities, and offices.

Table 20: Status of Selected Park Planning or Study Documents

Document	Status
Master Plan	Approved, 1974
Wilderness Recommendation	Approved, 1972
Greater Yellowstone Regional Transportation Study	Approved, 1980
Fishing Bridge Development Concept Plan (DCP)	Approved, 1988
Grant Village DCP	Approved, 1979
Old Faithful DCP	Approved, 1985
Lake/Bridge Bay DCP	Approved, 1993
DCPs for other areas[a]	All pending funding
Traffic Engineering Safety Improvement Study	Completed 1986
Road Improvement Plan	Approved, 1992
Implementation Plan/Access/Persons with Disabilities	Pending funding
Employee Housing/Community Plans	Approved, 1992
Resource Management Plan	In progress, 1992
Bear Management & Bear Recovery Plans	In progress, 1992
Backcountry Management Plan	In progress, 1992
Vegetation Management Plan	In progress, 1992
Vegetation & Exotic Vegetation Management Plans	In progress, 1992
Land Protection Plan	In progress, 1992
Landfill/Dump Plan	In progress, 1992
River Use Assessment	Approved, 1988
Winter Use Plan	Approved, 1990
Cultural Sites Inventory	Approved, 1986
Water Resources Plan	In progress, 1992
Cultural Sites Protection Plan	In progress, 1992

Source: Yellowstone National Park, *Statement for Management*, 1991 updated by NPS, 1993

[a] Canyon Village, east entrance, Madison Junction, Mammoth Hot Springs, northeast entrance, Norris, south entrance, Tower/Roosevelt, west entrance

ALTERNATIVES DEVELOPMENT AND SCREENING

The identification of potentially viable transportation alternatives for Yellowstone National Park involved a two step process. The first step consisted of identifying VTS service concepts and areas where transportation systems might be cost-effective and feasible. Once the areas were identified, applicable transit technology options were developed and evaluated during the second step.

Several factors had a major influence on the development of alternatives:

- the proportion of visitors going to Yellowstone as part of a larger vacation trip
- the large proportion of visitor trips into the park through one gate and out through another
- the high costs in labor and equipment associated with capturing visitors at points far removed from their destinations
- complications associated with sorting traffic by destination, day versus overnight use, and planned activity
- the need to allow unrestricted movement of wildlife across and along the transportation system
- the use of proven, available technologies for visitor transportation systems
- the requirement that alternatives had to represent potentially cost-effective and resource sensitive solutions to transportation problems in Yellowstone

CRITERIA FOR DEVELOPMENT AND EVALUATION OF ALTERNATIVES

Criteria were prepared to guide the development of transportation system alternatives, to focus the initial screening of alternatives to a smaller set of feasible options, and to direct the comparison of the feasible alternatives for Yellowstone. The criteria were developed to respond to the study purpose as stated in Intermodal Surface Transportation Efficiency Act and to account for the unique transportation problems and environmental conditions at the park.

Visitor use patterns were a major consideration in the development of transportation alternatives.

Essential Requirements

To be considered for detailed evaluation, transportation improvement alternatives for Yellowstone were required to have the following essential characteristics:

- Be able to accommodate estimated visitation or ridership levels in the areas to be served.
- Afford a meaningful reduction in private vehicle travel.
- Allow current visitor use patterns to continue, including the ability to conveniently visit more than one area of the park in a one-day visit, and allow visitors to experience a full range of scenic and wildlife-oriented activities.
- Have the potential to reduce vehicle-related emissions.

- Have the potential to reduce energy consumption associated with transportation.

- Maintain visual quality in key areas.

- Employ proven, available technologies for visitor transportation systems.

- Be capable of operating in a safe manner in the Yellowstone environment.

- Comply with the requirements of the Americans with Disabilities Act.

- Allow unrestricted movement of wildlife across and along the transportation system corridors.

- Provide the opportunity for healing and improvement of existing road edge habitat.

- Have the potential to manage visitor encroachment into sensitive natural areas.

The evaluation of alternatives that met the essential requirements was organized into the following major topics.

Visitor Transportation and Management

This evaluation measured the convenience of the alternatives for visitors, based on travel time, waiting time, the number and reliability of transfers required, and ease of use. Each alternative was assessed for its ability to serve expected travel demand patterns and for the quality of visitor access. The evaluation also addressed the contribution of the alternatives to the achievement of Yellowstone's visitor management goals. Comparability between facility carrying capacity and the transportation capacity of the alternatives was considered.

Visitor Experience

The alternatives were compared with respect to the character of visitor experience offered and the comfort of passengers using the service. Measures included noise, crowding, and visual disruption. The ability of the alternatives to enhance the natural and wilderness character of the park by complementing the surroundings and by reducing the influence of automobiles was considered. This group of criteria included the impacts of the alternative transportation systems on vistas from points adjacent to the alignment and from key viewpoints. Alternatives that addressed existing problems with overcrowding and delays due to traffic congestion received positive scores for visitor experience.

Visual quality must be maintained in key areas.

Resource Impacts

Alternatives whose ongoing operation would minimize impacts to the critical resources of the park would be preferred over those that would cause disruption of natural processes. The primary basis for comparing impacts included changes in vehicle miles traveled, changes in emissions (using relative comparisons, rather than absolute calculations), changes in the location and area of parking facilities, the potential to restore areas to natural conditions, and contributions to reduced wildlife impacts by the removal of vehicle traffic from key habitat areas. The construction impacts of alternatives, including noise, vehicular activity, staging area needs, and material requirements were also considered.

Consistency with Planning Goals

Alternatives were assessed for their consistency with park, gateway community, and regional goals. The need for cooperative action from other agencies and potential impacts to private property were evaluated. The consistency of the alternatives with park goals stated in the *Master Plan* was also considered.

Cost and Cost-effectiveness

Construction, equipment, operation, and maintenance costs were estimated for each of the final alternatives. These costs were compared to visitor volumes to assess the cost-effectiveness of each option using cost per passenger. The potential of each alternative to attract funding from sources outside the National Park Service also was considered.

Implementation

The impacts of the alternatives on park management, employee housing, and off-site conditions were evaluated. Special implementation requirements, such as environmental compliance activities and wilderness management exemptions, were also assessed. The ability to phase improvements while maintaining visitor access was evaluated.

SERVICE CONCEPTS

A variety of VTS service concepts were considered in the development of transit alternatives for Yellowstone. Each concept had a companion policy about private vehicle transportation. The VTS service concepts that could be developed at Yellowstone include:

- *Parkwide Mandatory* - Under this concept, private vehicular travel would be prohibited within the park. Staging areas at or near each entrance station would be used to intercept private vehicles and would serve as transfer stations to VTS routes. A number of routes would traverse the Grand Loop Road and entrance roadways, with transfer points providing access to any activity area from any entrance station. Trips through the park by private vehicles would be prohibited.

- *Parkwide Voluntary* - This concept would provide similar VTS routes to the mandatory concept, but less capacity would be required because many visitors would continue to use private vehicles for all or a portion of their trips. Staging areas would be provided at the entrance stations and might also be located at several points along the Grand Loop Road. This concept would provide an optional means of travel for those visitors who prefer not to drive. It is expected that the use of a parkwide voluntary system would be very low, as reflected in the current ridership of concessioner operated bus services in the park.

- *Entrance Station to Activity Area Shuttle* - This service would connect an individual entrance station with one or more of the major activity areas in the park. It would be a voluntary service because it would not provide visitor access to all possible destinations. It would be most applicable at those entrance stations with substantial overnight lodging or camping facilities nearby and at the entrance stations with the highest volumes of visitor entries. This type of service would be most attractive to visitors staying overnight in gateway communities and visiting Yellowstone for a single day, entering and exiting through the same entrance station.

- *Grand Loop Segment Shuttle* - In this service concept, a transportation system would be provided along a segment of the Grand Loop Road, connecting two or more of the park's major activity areas. Although a voluntary system could be implemented, a mandatory system would be more appropriate because few riders would use a voluntary system of this type. The primary reason to implement this service concept would be to reduce resource impacts in sensitive habitat areas or to provide an alternative visitor experience to the typical driving tour of the park.

- *Activity Area Circulator* - This concept would provide a relatively short distance circulator service through a heavily visited activity area. It would be most appropriate in combination with restrictions on private vehicular access. An example of this type of service is the west rim shuttle, operated during peak visitation periods at Grand Canyon National Park.

The VTS concepts initially considered for implementation at Yellowstone are described below.

Parkwide Mandatory Visitor Transportation System

A mandatory parkwide VTS concept was developed to identify VTS services, equipment, and facilities that would be required to stop all park visitors near the park boundary and provide public transportation access to lodging and park features throughout Yellowstone. All private vehicular traffic would be prohibited on park roads. A mandatory system was assessed because of the low ridership levels expected with a voluntary system.

The concept would provide for the interception of all day use and overnight visitor traffic at staging areas located near each of the five entrance stations. Passengers would be transferred at these locations to a visitor transportation system for all of their travel within the park. The following areas, near the entrance stations, were selected as representative staging area locations for this concept.

- north entrance - immediately outside of entrance gate between the TWRS maintenance facility and the park entrance road
- northeast entrance - inside the park in the vicinity of the Pebble Creek campground
- east entrance - approximately 1 to 5 miles outside of the park on national forest lands
- south entrance - about 3 miles outside the park near the Flagg Ranch development
- west entrance - on the northwest side of West Yellowstone near the airport

Six transit routes were developed to provide visitor access to all of the major activity areas. With the proposed routes, each major activity area could be reached with a maximum of one transfer, except for certain trips from the northeast entrance that would require two transfers. The following routes (displayed on the Parkwide Mandatory VTS Alternative map) were developed to provide a parkwide transit system:

- west entrance to east entrance via Canyon
- east entrance to west entrance via West Thumb
- north entrance to Madison Junction via Norris
- northeast entrance to north entrance via Tower
- south entrance to Madison Junction via Old Faithful
- Tower to Canyon via Dunraven Pass

Major transfer facilities would be provided at Mammoth, Tower-Roosevelt, Norris, Canyon, Madison Junction, Lake/Fishing Bridge, and West Thumb. Old Faithful, Grant Village, and Bridge Bay would also be included as major transit stops. Additional activity locations along each route could be designated as informal or on-demand stops.

Motor coach buses were chosen to provide the service because they represent the most economical technology to provide service on the nearly 350 miles of two-way route that would need to be covered under this alternative. Buses would also offer the best opportunities for on-demand stops and would allow visitors to access trailheads and other minor destinations. A cog rail system was selected to provide service on the Dunraven Pass link due to the steep grades and poor condition of the road.

A parkwide visitor transportation system would affect the following two primary quantifiable aspects of visitor use and park management:

- *Travel Time and Parking Space Requirements* - The time required to travel to and from desired destinations on transit vehicles would considerably lengthen the time spent making a visit to the park and would result in a need for large staging areas at each entrance station.

- *Shuttle System Fleet, Operating Requirements and Operating Costs* - Large vehicle fleets would be required to transport visitors to and from the staging areas outside the park. Service would need to be available at closely timed intervals to provide adequate capacity and convenient service to visitors. The large fleets and long travel distances would require significant levels of funding for fleet acquisition and for ongoing operations.

Additional considerations associated with a parkwide transportation system include the following:

- *Delays to Through Visitors* - Visitors coming to Yellowstone as part of larger travel itineraries that involve entering the park through one gate and leaving through another would be inconvenienced by the need to travel to and from their park destination on public transportation and then travel a much longer route around the park to continue their trip. Over 75% of Yellowstone visitors now enter and leave the park at different locations.

- *Overnight Accommodation Reservations and Confirmations* - It would be necessary to provide facilities at the staging areas to allow visitors to make lodging and camping arrangements or confirm their reservations and determine if they would be day users or overnight visitors.

- *Luggage and Equipment* - The wide variety of visitor activities in Yellowstone, including camping, backpacking, hotel stays, and boating require visitors to bring equipment with them into the park. The transportation system would need to accommodate this equipment and provide a means for organizing the equipment to allow visitors to retrieve it at their destinations. Visitors in RVs wishing to use campgrounds could not be accommodated by a visitor transportation system.

- *Visitor Information* - An information center or visitor center would be necessary at each of the staging areas to direct visitors to their desired destinations and respective VTS routes. Restroom and shelter facilities would also be required to accommodate visitors before their departures into the park.

Table 21 provides a summary of the parking and equipment requirements necessary to support mandatory parkwide VTS service. The passenger demand for the service was estimated based on 1992 peak season average daily traffic volumes into and within the park. The costs provided in table 21 do not include support facilities and are based on different operating concepts than those developed for the individual VTSs described later in this chapter.

The parkwide concept would require over 145 acres of parking lots, more than 700 buses, and 31 cog rail vehicles. Total capital costs would be over $530 million, with an additional $72.6 million in operating costs per year. The annualized cost per peak season visitor (1992 statistics) would be about $58.00. The high cost of a parkwide system and the negative impacts of such a system on visitor convenience and visitor experience make this concept unworkable for Yellowstone.

Other VTS Service Concepts

The principal road system in Yellowstone serves seven main activity centers, as well as countless natural features within the park. Current visitor use patterns depend on the ability to conveniently visit more than one area of the park in a multi-day visit, to make trips through the park by entering and exiting through different gates, and to experience a full range of scenic and wilderness-oriented

Table 21: Parkwide VTS Costs and Operating Requirements

Requirements	West to East (via Canyon)	East to West (via West Thumb)	North to Madison Junction (via Norris)	Northeast to North (via Tower)	South to Madison Junction (via Old Faithful)	Tower to Canyon (via Dunraven Pass)	Total System
Parking Spaces	3,411	3,206	1,785	1,711	2,902	NA	13,015
Parking Lot Area (Acres)	37.9	35.6	19.8	19.0	32.2	NA	145.5
Round Trip Route Length (miles)	171	195	80	85	116	38	685
Transit Vehicles	238	216	59	65	129	31	738
Peak Period Service Intervals (min.)	2.0	2.5	4.0	3.75	2.5	6.0	
Construction and Equipment Costs (millions)	$81.3	$74.0	$22.6	$24.2	$46.8	$283.0	$531.9
Seasonal Operating and Maintenance Costs (millions)	$21.4	$20.1	$5.6	$6.3	$12.0	$7.2	$72.6
Annualized Cost Per Peak Season Visitor							$58.48

Source: BRW, Inc.

Notes:
- Costs represent total costs (contingency, planning and supervision percentages applied where appropriate) for vehicle fleet, rail alignment, and parking spaces only.
- Staging area location for parking space requirements corresponds to first entrance name in route description.
- NA = Not Applicable

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activities. About 90% of trips to Yellowstone are made in private vehicles.

The alternatives with the greatest likelihood of being cost-effective and of having meaningful benefits for resource protection and visitor enjoyment were identified for each of the VTS service concepts. The areas that would be served by the systems are highlighted on the Candidate Areas for Transit Service map. The following sections discuss the most promising VTS alternatives for more in-depth evaluation.

Entrance Station to Activity Area Shuttle. This service concept is most applicable for those park entrances where visitors travel to and from the entrance station in a single day. This travel pattern is most common the west and north entrance stations because both have nearby gateway communities with lodging units that provide overflow capacity for the park. The success of this type of service would depend on conveniently located, adequately sized parking facilities. In areas of short-term visitor use, parking to support a shuttle service would have to be located close to the features. Distant staging areas would result in long delays, higher capital and operating costs because of increased fleet requirements, and more parking spaces due to lengthened stays in the staging area lot. Table 22 illustrates these points.

Another desirable condition for this service would be the location of one of the park's major activity areas along the route. The north entrance station is only five miles from the Mammoth activity area, which attracts an estimated 8,000 visitors per day during the peak season. Norris Geyser Basin, about 22 miles from Mammoth is a second potential destination, which now attracts about 6,000 visitors per day (some of whom also visit Mammoth in a given day). Although a VTS connection from the north entrance meets the basic requirements for this service concept, it would serve one of the lower volume entrances (the north station attracts only 14 percent of all entries) and would only provide service to one or two activity areas with somewhat lower visitation than the two most visited areas - Old Faithful and Canyon.

Service from the west entrance station to Old Faithful would connect the station with the highest volume of vehicle entries (34 percent of all park entries) to the activity area with the highest level of visitation (25,000 visitors per day). The west entrance also has the lowest proportion of travel through the park. About 38% of the Visitors leave through the west entrance had entered the park at the same station. Numerous secondary activity areas and viewing sites could be served along the route. An extension of the route to the West Thumb/Grant Village area would connect the route to a potential reservoir of parking which could capture some visitors coming to Old Faithful from the south activity areas. The West Yellowstone/Old Faithful/West Thumb route would have a much greater positive impact than the route between the north entrance and Mammoth/Norris.

Grand Loop Road Segment Shuttle. Nine segments of the Grand Loop Road were identified for implementation of this VTS concept. Factors that were considered in identifying the segments with the greatest potential benefit from VTS implementation included:

- volume of traffic
- potential diversion of through-trips and inconvenience to visitors
- presence of habitat, wildlife, or geothermal features that would benefit from restricting private vehicular traffic
- ability to provide a unique visitor experience

Only two of the nine segments were considered suitable for implementation of visitor transportation systems – Fishing Bridge/Canyon and Canyon/Tower. The Fishing Bridge/Canyon segment is appropriate because of the current high volume of travel along this segment and the sensitive wildlife habitat and high concentrations of animals in the Hayden Valley. A visitor transportation system through Hayden Valley would likely attract a high level of use and would afford visitors a unique experience that would include frequent

Table 22: Illustrative Parking and Shuttle Needs for Remote Staging Areas

Staging Area Location	Total Stay (min)	Parking Spaces Needed	Bus Fleet Needed
At Attraction	30	50	0
5 Minutes from Attraction	40	67	2
10 Minutes from Attraction	50	83	4
15 Minutes from Attraction	60	100	5

Source: BRW, Inc.

Assumes 300 visitors per hour, 3.0 visitors per private vehicle, 30-passenger bus, 30 minute stay at attraction

unobstructed views of wildlife. A visitor transportation system would reduce existing problems with frequent animal-caused traffic delays and the disruption of wildlife migration patterns by high volumes of traffic on the road. This segment also connects two areas that have large numbers of overnight visitors who could make VTS tours while their vehicles remained at their overnight accommodations.

A second Grand Loop Road segment that could be successfully served by a VTS route is the Canyon/Tower segment over Dunraven Pass. This roadway has perhaps the poorest surface conditions of any segment. An alternative to rebuilding the road for private vehicular traffic would be to replace it with a guideway transit system. Like Hayden Valley, Dunraven Pass offers unique viewing opportunities -- in this case because of its high-mountain terrain and habitat which are distinctly different than the streamsides along many of the other park road segments. Major sheep migration patterns are now affected by traffic on the road. A transportation system could reduce the disruption to sheep migration by reducing the volume of traffic.

The activity areas served by the two candidate roadway segments would be accessible by private vehicle from other directions. The greatest impact on private vehicle access would be felt at Canyon if both visitor transportation systems were implemented and the Dunraven Pass and Hayden Valley roadway segments were closed to private vehicles. Access to Canyon in private vehicles under these conditions would be via Norris. The Tower and Lake/Fishing Bridge areas would be accessible from the north and northeast entrances and the south and east entrances, respectively, if both roadway segments were closed to private vehicular traffic.

Another roadway segment where closure would have significant resource benefits is the Madison/Old Faithful segment. This segment is characterized by bison migrations, meadow habitat, and very active geothermal conditions that result in continuing road maintenance needs. Implementing a visitor transportation system and restricting private vehicular traffic along this road segment would result in Old Faithful being accessible to private vehicles from only one direction. This could result in unacceptable congestion on the roadway between West Thumb and Old Faithful.

The impacts of thermal activity now being experienced on the road would be a major concern for a visitor transportation system, whether it used rubber-tired vehicles and the existing road or a new guideway or track. For these reasons, a mandatory VTS alternative on the Madison to Old Faithful segment was not considered as a stand-alone alternative. Service along this segment was considered as part of the voluntary West Yellowstone/Old Faithful/West Thumb route.

Activity Area Circulator. The appropriate conditions for implementing a VTS circulator within an activity area include high visitation levels, the presence of scattered viewpoints or features at distances greater than a convenient walk, and potential stops along logical routes. Terrain, geology, and habitat conditions that would permit VTS implementation without significant negative impacts to park resources are also required.

The three most visited activity areas in Yellowstone are Old Faithful, Canyon, and Grant Village/West Thumb. Visitation at Mammoth Hot Springs, the next most popular destination, is only one-third of that at Old Faithful.

The most appropriate activity area for VTS circulator implementation is Canyon. The scattered viewpoints along the north and south rims are ideally situated for access via a circulator route. A system at Canyon could operate in much the same manner as the very successful west rim shuttle at Grand Canyon National Park.

Although Old Faithful is mainly a single attraction, an effective circulator system could be developed to serve Old Faithful and the thermal features to the north along the road to Madison. The regular and periodic eruptions of Old Faithful lead to surges in traffic and over-capacity conditions at the small parking areas serving the other thermal features. By allowing some visitors to access features near Old Faithful on a visitor transportation system, peaks in traffic volumes could be flattened and parking demand could be reduced.

Although Grant Village/West Thumb is visited by 10,000 visitors per day, the activities in this area do not lend themselves to service by a visitor transportation system. Many of the visitors to this area are passing through on the way to Old Faithful and would not be attracted to such a system.

DEVELOPMENT OF ALTERNATIVES

Visitor transportation system alternatives were developed for the five areas of concentrated activity and travel that were discussed in the previous section. Each alternative is summarized below and presented in detail on the attached maps and charts.

The Grand Canyon of Yellowstone area is well-suited to a visitor transportation system.

West Yellowstone to Grant Village (via Old Faithful)

One alternative was identified and developed for this area. It consisted of a voluntary shuttle bus system linking West Yellowstone and Grant Village. The system would serve the Old Faithful area plus other popular geyser basins and trailheads along the route. The service frequency would be 15 minutes during peak periods and 30 minutes in off-peak periods. Stops would include access points along the Madison River and at Madison Junction, Fountain Paint Pots, Midway Geyser Basin, Biscuit Basin, Black Sand Basin, Old Faithful, Kepler Cascades, Delacy Creek, and West Thumb. Visitor parking would be provided in West Yellowstone and Grant Village. About 200 spaces would be needed to serve the projected demand at each end. An existing surplus of 78 spaces now available at the Grant Village visitor center could reduce the need for new construction to 122 spaces at that location. A number of staging area options exist for West Yellowstone. A representative site near the airport (northwest of town) was considered for this alternative.

Hayden Valley (Lake to Canyon)

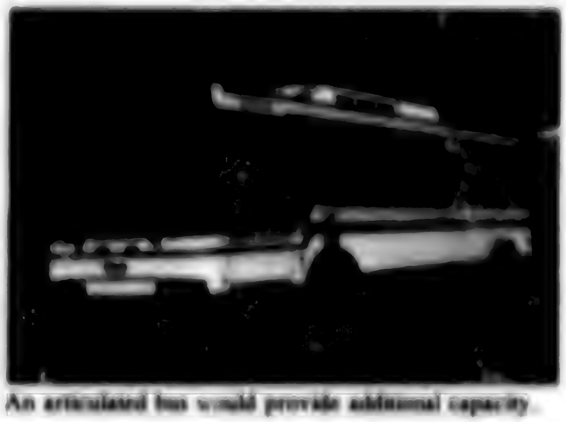
Four VTS alternatives were developed for this segment. All of the alternatives are identical in route length, number of stops, and the location and size of auxiliary parking areas. The difference between the alternatives is in the type of transit technology used.

The alternatives included:

- shuttle using conventional bus
- shuttle using articulated bus
- elevated monorail or other group rapid transit (GRT) technology
- self-propelled rail transit

On-demand stops would be available with the bus and self-propelled rail service. The monorail option would require elevated stations at all access locations.

A conventional bus could be used for a shuttle system.



An articulated bus would provide additional capacity.

With all of these alternatives, the roadway would be closed to private vehicular traffic and transit use would become mandatory. This action would result in a 90% decrease in daily vehicular traffic through Hayden Valley. Both the elevated monorail and the self-propelled rail transit alternatives would require the construction of new guideways. A service road for maintenance, law enforcement, and emergency vehicles would be retained adjacent to the VTS routes. The monorail alternative would require an electrical power source to be delivered to the guideway.

Staging areas would be located at both Canyon and Lake Village for this service. A total of 683 auto and recreational vehicle parking spaces would be required at Canyon to accommodate the projected demand. By using an existing surplus of 124 spaces, only 559 new parking spaces would be required. The parking requirements reflect the demand associated with a Hayden Valley VTS route only. Parking requirements associated with a possible Canyon circulator are presented under a separate alternative.

The Lake Village staging area would require approximately 893 auto and recreational vehicle spaces. The larger number of required spaces is because visitors are expected [illegible] some time in the Canyon area as part of their round trip.

Dunraven Pass (Canyon to Tower)

Two alternative VTS technologies were identified for this segment.

- conventional bus or large bus
- cog railway

An elevated monorail system might appeal to visitors.

Both alternatives would operate between the Canyon Village area and the Tower-Roosevelt area, with interim stops at Mt. Washburn Road and Tower Fall. Visitors to Mt. Washburn would hike from a transit stop located on the Grand Loop Road. The roadway would be closed to visitor traffic and VTS use would be mandatory in both cases.

With either VTS technology, access would be maintained to other trailheads along the Dunraven Pass road segment. The cog railway alignment could be constructed on or adjacent to the existing roadway alignment. A narrower road could be retained for service vehicles, or utility service vehicles could be operated on the cog railway.

Staging areas would be located at both Canyon and Tower to support service on the Dunraven Pass segment. Passengers originating at Tower are assumed to stay longer because of activities at Canyon. A total of 612 auto and RV spaces would be needed to serve the estimated demand at Tower, and about 476 spaces would be necessary at Canyon. The number of new parking spaces required at Canyon could be reduced by using an existing surplus of 124 spaces. A common staging area and maintenance facility could be shared at Canyon if either the Hayden Valley or the Canyon area system was also implemented.

A self-propelled rail system would be compatible with the wilderness setting of Yellowstone.

Grand Canyon of Yellowstone Area

Three alternatives were identified and developed for this area. The north rim shuttle bus alternative would consist of closing the North Rim Drive from the camper services facility to the intersection with the Grand Loop Road near Lower Falls view. Private vehicle access to the overlook and trailhead parking areas would be eliminated and visitors would be shuttled to each vantage point from a parking area located in the Canyon Village area.

A combination of 124 existing surplus spaces and 559 new parking spaces would provide the necessary 683 vehicle spaces for automobiles and recreational vehicles in Canyon Village. A north rim VTS alternative could also share a common staging area and maintenance facility with a south rim, Hayden Valley, or Dunraven Pass system.

Shuttle buses would transport passengers from the Canyon Village staging area to Inspiration Point, Grandview, Lookout Point, and Brink of Lower Falls along the North Rim Drive.

Passengers would board the buses in the areas where private vehicle parking is currently offered. Buses would operate at frequent intervals to allow visitors to walk to a different location or board other buses after taking in the view. Shuttle stops would also provide a link with the Canyon hiking trail system.

The other two alternatives would provide service to the south rim. The second alternative would use shuttle buses, and the third would use an elevated monorail or other GRT system. For the bus alternative, the service would start at the Upper Falls lot and proceed to the South Rim Drive along the Grand Loop Road. For the monorail system, service would operate between Wapiti Trailhead and Artist Point, with a stop at Uncle Tom's Trail. The south rim roadway would be closed to visitor traffic beyond Uncle Tom's Trail under both alternatives.

A total of 195 additional parking spaces at Upper Falls view, Wapiti Trailhead, or Uncle Toms Trail would be required to support the bus alternative. The combined total of 260 existing spaces at the three lots would provide over half of the total estimated requirement of 455 spaces.

A total of 379 parking spaces would be needed to serve the estimated demand of a monorail alternative. Parking demand is less for the monorail alternative due to a shorter route length and duration of stay. The 178 existing parking spaces at Wapiti Trailhead and Uncle Tom's Trail would reduce the parking requirements to 201 new spaces. A south rim VTS alternative could potentially share a maintenance facility with other transportation systems serving the Canyon area. For the purpose of this study, north and south rim transportation systems were evaluated separately. The alternatives evaluated here could potentially be combined.

Old Faithful/Geyser Basin Area

Two circulator bus alternatives were identified and developed for this area. The first alternative would use conventional buses, the second articulated buses. The service would leave from Old Faithful and travel to Firehole Lake Drive with stops at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, Great Fountain Geyser/White Dome Geyser, Firehole Lake, and Fountain Paint Pots. These features currently have small parking areas.

Under this alternative, the existing road could be closed and obliterated/reclaimed north of Fountain Paint Pots. Traffic could be rerouted to the west on Fountain Freight Road. Visitor traffic could be restricted from using the old road north of Midway Geyser Basin and on Firehole Lake Drive. Private vehicular parking could be eliminated at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, and Fountain Paint Pots Trail.

Existing surplus parking spaces at the Old Faithful development could be used for a transit staging area. A surplus of 141 spaces was identified in the west lot at Old Faithful. An additional 734 spaces would provide the total of 875 auto and RV spaces required to support a visitor transportation system serving the Geyser Basin area.

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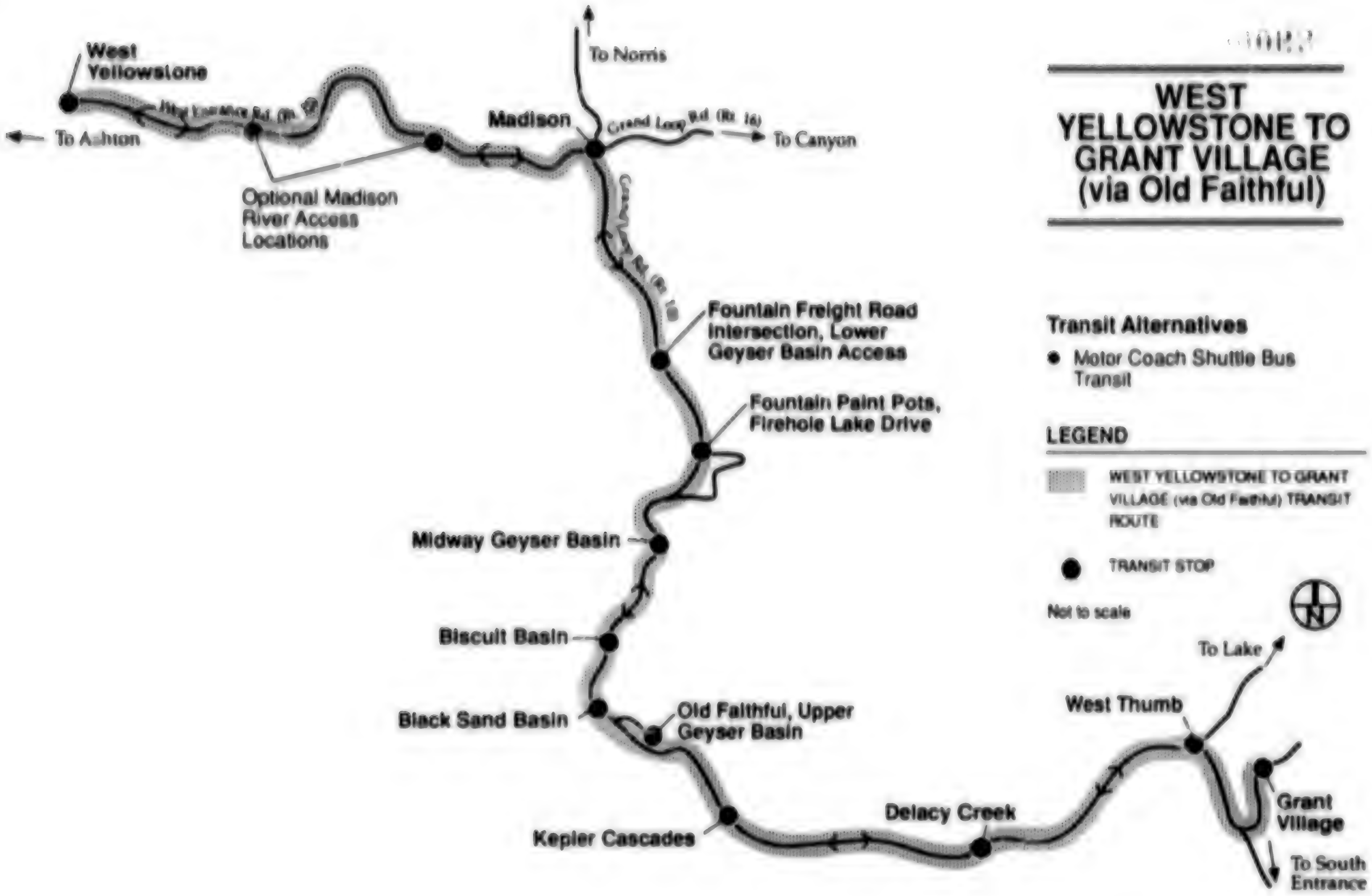
WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful)



Transit Alternatives

- Motor Coach Shuttle Bus Transit

LEGEND

▨ WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful) TRANSIT ROUTE

● TRANSIT STOP

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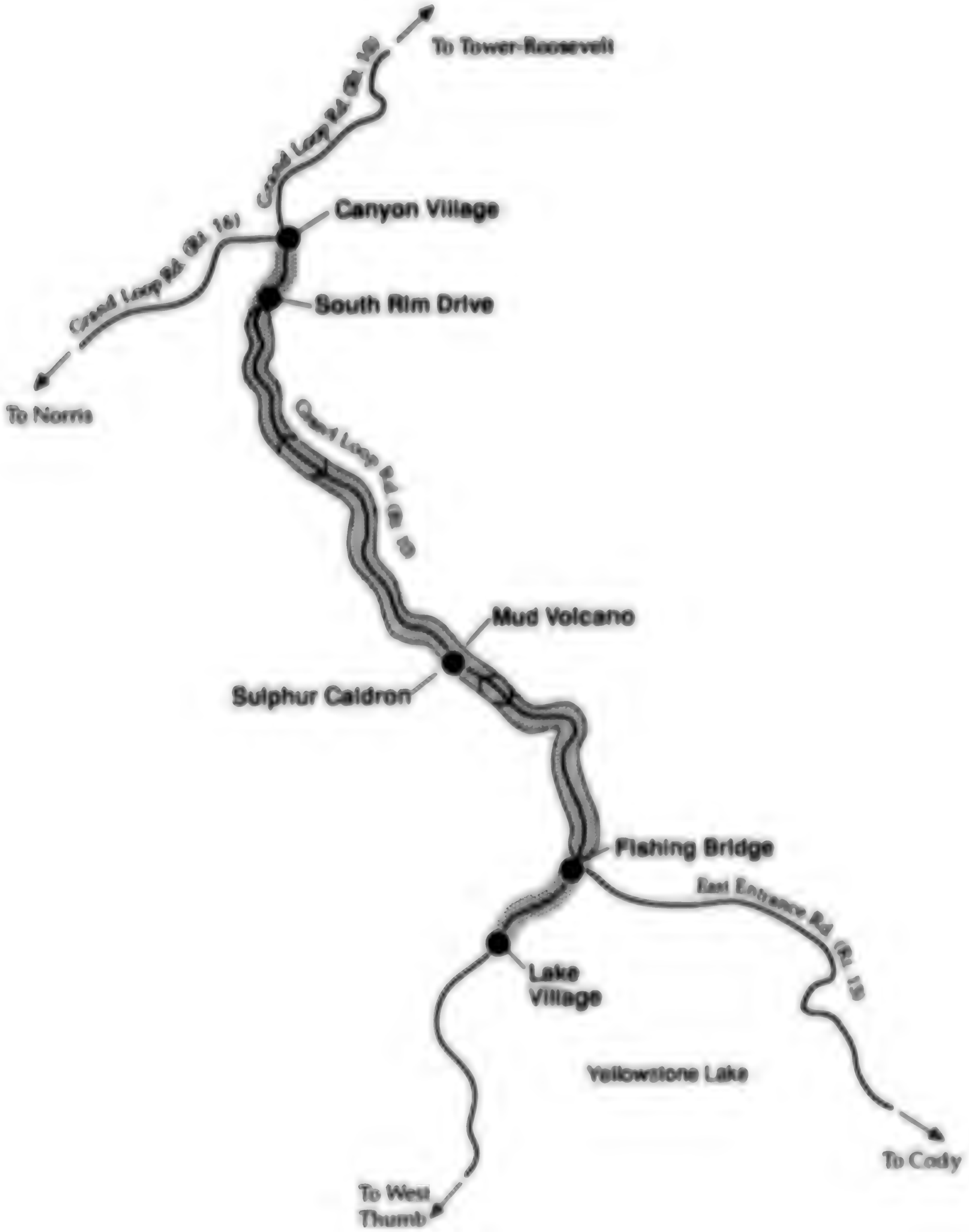
West Yellowstone to Grant Village (via Old Faithful)
VTS Alternative Definition

	Motor Coach Shuttle Bus Transit Alternative	
Shuttle Round Trip Route Length (miles)	109.0	
Shuttle Daily Access and Egress Boarding Capacity*	3,840	
Shuttle Fleet Size	20	
Shuttle Daily Vehicle Round Trips	40	
	Auto & RV	Bus
West Yellowstone Staging Area Total Parking Spaces Required	200	0
Existing Surplus Spaces Available	0	0
Net Parking Spaces Required	200	0
Grant Village Staging Area Total Parking Spaces Required	200	0
Existing Surplus Spaces Available (Grant Village Visitor Center)	78	0
Net Parking Spaces Required	122	0

* Assumes two boardings per visitor. Additional linked trips may occur.



HAYDEN VALLEY SEGMENT

Transit Alternatives

- Conventional or Large Shuttle Bus Transit
- Elevated Monorail Group Rapid Transit
- At-Grade Self Propelled Rail Transit

LEGEND

▨ HAYDEN VALLEY TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

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Hayden Valley (between Lake Village and Canyon) VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Articulated Shuttle Bus Transit Alternative		At-Grade Self-Propelled Rail Transit Alternative		Elevated Monorail Transit Alternative	
Shuttle Round Trip Route Length (miles)	34.5		34.5		34.5		34.5	
Shuttle Daily Access and Egress Boardings*	18,010		18,010		18,010		18,010	
Shuttle Fleet Size	80		54		44		30	
Shuttle Daily Vehicle Round Trips	300		200		160		106	
	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus
Canyon Staging Area Total Parking Spaces Required	683	3	683	3	683	3	683	3
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	124	0	124	0	124	0
Net Parking Spaces Required	559	3	559	3	559	3	559	3
Lake Staging Area Total Parking Spaces Required	893	4	893	4	893	4	893	4
Existing Surplus Spaces Available	0	0	0	0	0	0	0	0
Net Parking Spaces Required	893	4	893	4	893	4	893	4

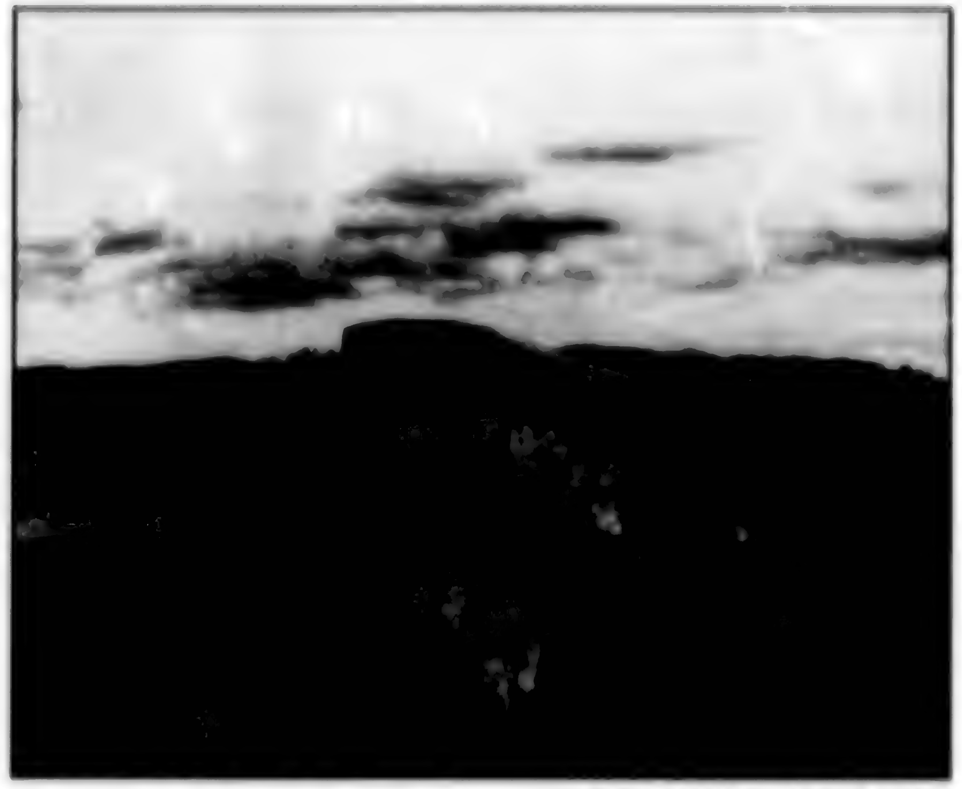
* Assumes two boardings per visitor. Additional linked trips may occur.

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.

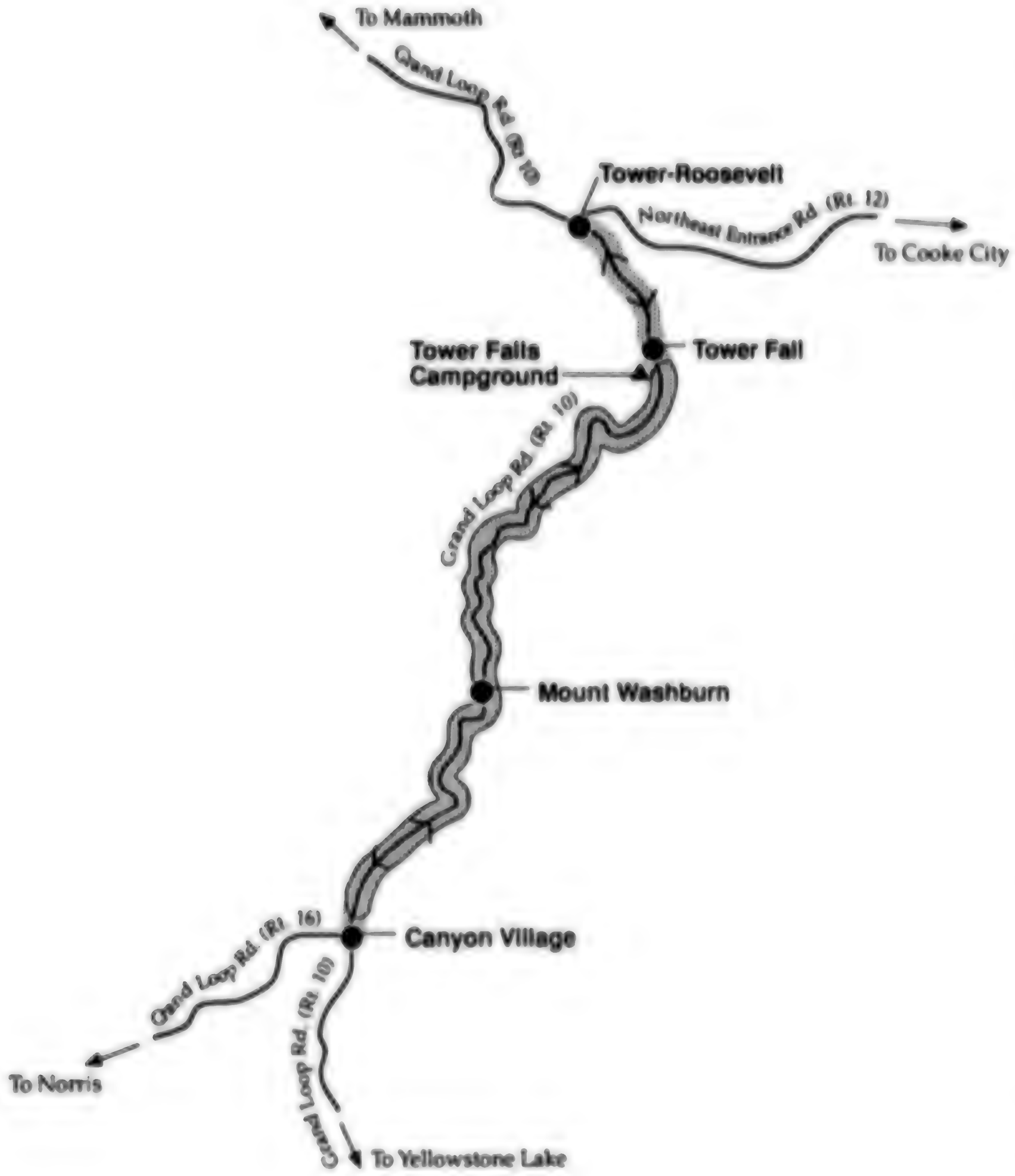
HAYDEN VALLEY EXISTING
CONDITIONS, VIEW LOOKING EAST

HAYDEN VALLEY VIEW WITH
ELEVATED MONORAIL TRANSIT SYSTEM

HAYDEN VALLEY EXISTING
CONDITIONS, VIEW LOOKING EAST



HAYDEN VALLEY VIEW WITH
AT-GRADE SELF PROPELLED RAIL TRANSIT SYSTEM



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DUNRAVEN PASS SEGMENT

Transit Alternatives

- Conventional or Large Shuttle Bus Transit
- Cog Rail Transit

LEGEND

▨ DUNRAVEN PASS TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

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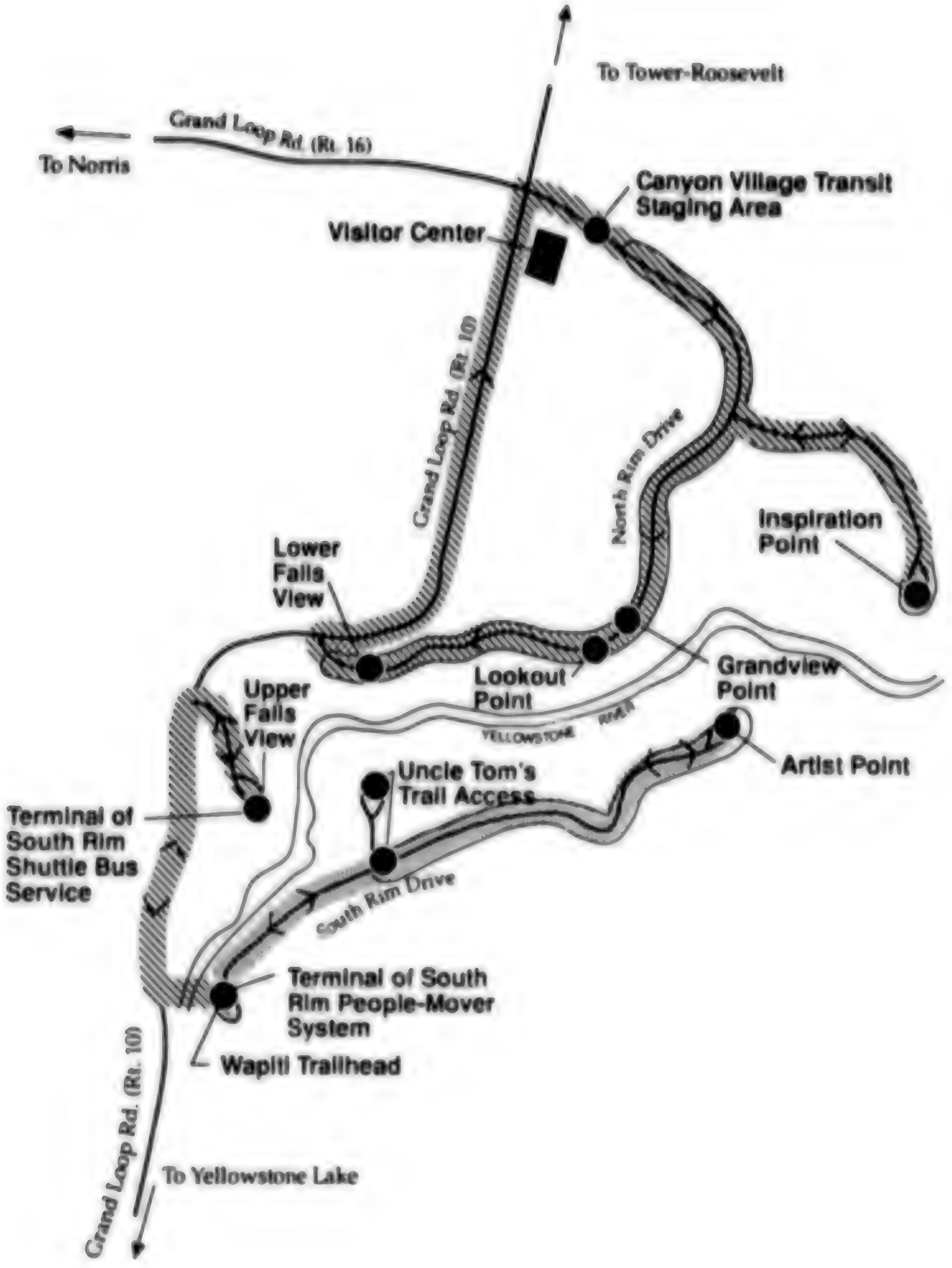
Dunraven Pass (between Canyon and Tower) VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Large Shuttle Bus Transit Alternative		Cog Rail Transit Alternative	
Shuttle Round Trip Route Length (miles)	38.0		38.0		38.0	
Shuttle Daily Access and Egress Boardings*	11,600		11,600		11,600	
Shuttle Fleet Size	60		48		32	
Shuttle Daily Vehicle Round Trips	200		160		106	
	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus
Canyon Staging Area Total Parking Spaces Required	476	2	476	2	476	2
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	124	0	124	0
Net Parking Spaces Required	352	2	352	2	352	2
Tower Staging Area Total Parking Spaces Required	612	2	612	2	612	2
Existing Surplus Spaces Available	0	0	0	0	0	0
Net Parking Spaces Required	612	2	612	2	612	2

* Assumes two boardings per visitor. Additional linked trips may occur.

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.



CANYON VILLAGE AREA

Transit Alternatives

- North Rim Conventional Shuttle Bus Transit
- South Rim Conventional Shuttle Bus Transit
- South Rim Elevated Monorail Group Rapid Transit

LEGEND

▨ BUS TRANSIT ROUTE

▒ BUS OR ELEVATED MONORAIL TRANSIT ROUTE

⬭ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

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Canyon Village Area VTS Alternatives Definition

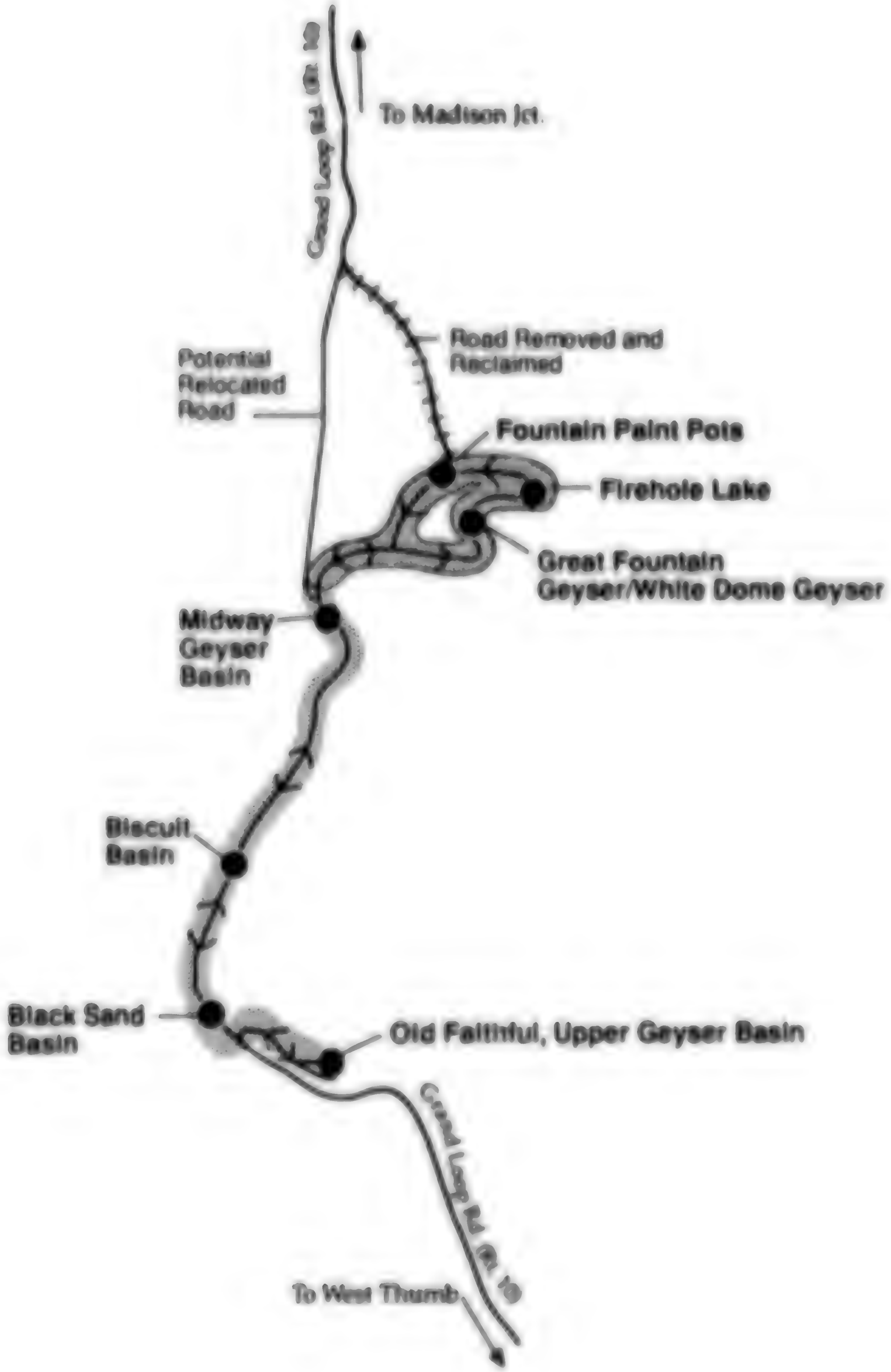
	North Rim Conventional Shuttle Bus Transit Alternative		**South Rim Conventional Shuttle Bus Transit Alternative**		**South Rim Elevated Monorail Group Rapid Transit Alternative**	
Shuttle Round Trip Route Length (miles)	5.20		6.37		3.12	
Shuttle Daily Access and Egress Boardings*	19,500		13,000		13,000	
Shuttle Fleet Size	14		11		4	
Shuttle Daily Vehicle Round Trips	300		200		92	
North Rim Staging Area Total Parking Spaces Required	**Auto & RV** 683	**Bus** 3	NA		NA	
Existing Surplus Spaces Available (Canyon Village Visitor Center)	124	0	NA		NA	
Net Parking Spaces Required	559	3	NA		NA	
South Rim Staging Area Total Parking Spaces Required	NA		**Auto & RV** 455	**Bus** 2	**Auto & RV** 379	**Bus** 2
Existing Parking Supplies Available (Upper Falls View, Wapiti Trailhead, Uncle Tom's Trail)	NA		260	0	178	0
Net Parking Spaces Required	NA		195	2	201	2

NA=Not Applicable

*** Assumes two boardings per visitor. Additional linked trips may occur.**

Note: Existing surplus parking spaces would only be available if not used by other optional transit services utilizing a Canyon Village staging area.

OLD FAITHFUL/ GEYSER BASIN AREA



Transit Alternatives

- Conventional or Articulated Shuttle Bus Transit

LEGEND

▨ OLD FAITHFUL/GEYSER BASIN TRANSIT ROUTE

○ ROAD CLOSED TO PRIVATE VEHICLE TRAFFIC

● TRANSIT STOP

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Old Faithful/Geyser Basin VTS Alternative Definition

	Conventional Shuttle Bus Transit Alternative		Articulated Shuttle Bus Transit Alternative	
Shuttle Round Trip Route Length (miles)	21.5		21.5	
Shuttle Daily Access and Egress Boardings*	15,000		15,000	
Shuttle Fleet Size	30		25	
Shuttle Daily Vehicle Round Trips	240		200	
	Auto & RV	Bus	Auto & RV	Bus
Old Faithful Staging Area Total Parking Spaces Required	875	3	875	3
Existing Surplus Spaces Available (Old Faithful West Lot)	141	0	141	0
Net Parking Spaces Required	734	3	734	3

* Assumes two boardings per visitor. Additional linked trips may occur.

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ALTERNATIVES EVALUATION

The final alternatives for West Yellowstone to Grant Village (via Old Faithful), Hayden Valley, Dunraven Pass, the Canyon Area, and the Old Faithful and Geyser Basin area were evaluated against criteria in each of the key evaluation categories described in the previous chapter; visitor transportation and management, visitor experience, resource impacts, consistency with park and other planning goals, cost and cost-effectiveness, and implementation constraints or requirements. Recommendations were not made to pursue specific alternatives. The intent of this report is to identify a range of feasible alternatives for establishing a VTS service in Yellowstone and to identify the primary benefits and impacts of those alternatives. More detailed analysis would be required to select and implement preferred alternatives.

The following sections provide an overview of the most important results of the evaluation of the final Yellowstone VTS alternatives. Comparisons are made between the alternatives and existing conditions in each of the activity areas and road sections served by VTS alternatives. The maps and charts provided at the end of the previous chapter illustrate the key physical aspects of each alternative. Charts at the end of this chapter provide a way to compare the alternatives against the evaluation categories listed above. A table summarizing the cost estimates for each alternative is also provided. Cost estimates for bus-based VTS alternatives do not reflect roadway rehabilitation or maintenance costs which may be required to support the transit service. Fixed guideway alternatives might also have additional costs associated with retaining or removing existing roadways which have not been included in the cost estimates presented here.

WEST YELLOWSTONE TO GRANT VILLAGE (VIA OLD FAITHFUL)

Visitor Transportation and Management

This alternative represents the best opportunity for a visitor staging area and visitor transportation system based outside the park. It would encourage the development and use of visitor support facilities outside the park, reducing the demand for in-park services. The park use patterns of riders on this system would be different from most. This alternative would encourage reductions in private vehicular traffic in the park and, if well used, could reduce traffic peaks following Old Faithful eruptions. Visitor use of this system could also help reduce demand for limited parking and decrease congestion levels at the geyser basin and trailhead parking areas north and east of Old Faithful. The service would be inconvenient for many visitors, especially those planning trips through the park. As a result, the ridership potential for this option would be low.

Visitor Experience

This and other VTS alternatives would provide a means of seeing a part of Yellowstone without the need for a private vehicle and would afford a different character of experience. Visitors would be freed of the responsibility of driving and could better enjoy the scenery. Visiting the park in a group on a bus could be less desirable for some than traveling only with family members in private vehicles.

This option offers the potential for park resource interpretation. Access to fishing, trailheads, picnic areas, and other recreational opportunities could be provided with on-demand stops, but would be less convenient than access by personal vehicle.

Resource Impacts

This alternative would result in minor decreases in vehicular traffic and the associated emissions, noise, and roadside habitat disruption. Orienting visitors at a staging area outside the park before their visit would likely prevent some inadvertent resource damage. A decrease in vehicular traffic or parking would assist in the preservation of sensitive geothermal areas.

Consistency with Park Service and Regional Planning Goals

This alternative would encourage economic development in West Yellowstone. It would also encourage the provision of visitor support services outside the park. The development of a staging area in West Yellowstone could affect natural or other resources in that community. Alternatively, the system could be designed to use lodging facilities in the community as pickup points for riders, making efficient use of existing parking areas.

Cost and Cost-Effectiveness

The cost-effectiveness of this alternative depends on the ridership it attracts. Limited in-park construction would be required, reducing costs. Existing parking or parking developed by private sector interests in West Yellowstone could further reduce costs to the Park Service. The cost for this alternative is summarized in table 23.

Implementation

The development of this alternative would require close coordination with the private sector and with West Yellowstone. Once the system was developed, the service could be provided by TWRS or other private entities. A large number of suppliers would provide a competitive bidding environment for vehicle acquisition. Housing for operating staff would cost a total of $0.9 million.

HAYDEN VALLEY (LAKE TO CANYON)

Impacts Common to All Alternatives

Three alternative technologies have been identified as options for providing mandatory VTS service along this segment of the Grand Loop Road. Many of the impacts of the alternatives are similar. Those impacts that are common to all of the technology alternatives are discussed first, followed by a description of the differences among the alternatives.

Visitor Transportation and Management. The Hayden Valley is one of the most heavily traveled segments of the Grand Loop Road. Closing this segment to private vehicular traffic would have significant impacts on traffic volumes on other segments of the road and on the trips of visitors. The impacts include lengthened travel times from Mammoth, and Tower to Lake and from Lake and West Thumb to Canyon, Norris, Mammoth, and Tower by private vehicle. Through trips between the east and west entrances would be lengthened in time and distance. Traffic would be diverted to the loop segments between Lake, West Thumb, and Madison Junction. The planned improvements to the Chief Joseph

Table 23: Cost Summary for West Yellowstone to Grant Village (via Old Faithful) Alternative

Cost Element	Motor Coach Shuttle Bus
Construction and Equipment (millions)	$6.8
Annual Operating and Maintenance (millions)	$2.0
Annual Passengers	217,700
Annualized Cost Per Rider	$12.15

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16 percent for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16 percent (of net) for contingencies, 15 percent (of net) for supervision, and 25 percent (of net) for planning.

Highway linking the east and northeast entrance routes outside of the park may increase the potential for through trips within the park between these two entrances. The closure of Hayden Valley to private vehicles could divert those trips to the west half of the Grand Loop Road. This alternative would provide a means to manage visitor access to one of the most ecologically sensitive areas of the park.

Visitor Experience. Each of the alternatives would provide a visitor experience distinct from the rest of Yellowstone. Less exposure to high traffic volumes and a slower pace would offer variety to those who could take the time to travel through the Hayden Valley by a visitor transportation system. The removal of vehicular traffic would also eliminate informal roadside parking. Opportunities for narration and other forms of interpretation would be available. Visitors making trips through the park would be inconvenienced by the closure of this section of road. Less personal freedom would exist for the visitors in this area, and the opportunity to have direct wildlife contact (discouraged by park staff) would be reduced. The implementation of any of the alternatives could lengthen visitor stays in the park because of trip diversions around the segment of road and additional time necessary to visit the area.

Resource Impacts. A major benefit of all of the alternatives would be the reduction of traffic in one of the more sensitive wildlife habitats of the park. Animal migrations are funneled into this area by Yellowstone Lake, the Yellowstone River Canyon, and the high peaks at the park's northern boundary. Reduced direct human contact would occur as visitors would not be able to stop and exit vehicles at every animal sighting. This would reduce stress on wildlife and promote natural movement patterns. Damage to habitat associated with informal roadside pull-offs and social trails would be reduced or eliminated. The alternatives would require large staging areas at Lake and Canyon Village, which would disturb habitat. Space requirements for staging areas would be relatively equal among the alternatives.

Consistency with Park Service and Regional Planning Goals. The alternatives could affect travel through the gateway communities of Cody, Wyoming and Cooke City and Silvergate, Montana. Park operations would be assisted by reducing the need for traffic safety and enforcement patrols and resource protection activities along the Hayden Valley road segment. Administrative travel along the road would be facilitated by eliminating congestion.

Cost and Cost-Effectiveness. The relatively high volumes of visitors that would use a visitor transportation system through Hayden Valley would require a substantial investment in staging area construction and vehicles, regardless of the technology.

Implementation. Each alternative would require environmental documentation for the development of staging areas at Lake and Canyon Village.

Evaluation of Alternatives

The following major differences between the alternatives were identified.

Visitor Transportation and Management. The monorail alternative might not provide reliable service during the occasional snowfalls that occur in the summer. In addition, the monorail alternative would provide less convenient access, requiring vertical circulation by stairs and elevators at stations. On-demand stops would not be possible with the monorail alternative. Both the self-propelled rail and monorail alternatives might require closing of access to the area during construction.

Visitor Experience. The character of visitor experience would be different among the alternatives. Visitors would be in smaller groups with the bus option in comparison to the self-propelled rail and monorail options. The noise and fumes associated with buses and with the diesel-powered self-propelled rail car could be unpleasant to visitors. The monorail option would offer very quiet operation.

The self-propelled rail and monorail alternatives might offer visitor appeal, although with markedly differing character. The rustic appearance of the self-propelled vehicles might be more consistent with Yellowstone's western character than the high-technology appearance of the monorail. The elevated monorail structure would be visible from long distances, affecting views from points away from the system. An additional visual impact would occur at electrical substations feeding power to the monorail system and along the power lines, which would feed electricity to the substations. The monorail option would afford fewer opportunities for visitor boarding and exiting points, because elevated stations would be required. Access to favored fishing spots along the Yellowstone River would be more difficult. The elevated monorail system could offer a dramatic viewpoint for visitors. On-demand stops would be possible with the bus and self-propelled rail transit alternatives.

Resource Impacts. The monorail option would eliminate vehicle/animal conflicts by isolating the system from the surrounding environment. Very little noise and no local emissions would be produced, affording the maximum benefit to wildlife. The limited maintenance requirements along either fixed guideway option would allow the roadside habitat to heal. The bus and self-propelled rail options also would reduce wildlife impacts by eliminating high volumes of private vehicular traffic.

The monorail and self-propelled rail options would change the historic use of the Grand Loop Road in the Hayden Valley area. They also could affect archeological sites, thermal features, and seismic activity. Temporary wildlife disturbance and localized habitat impacts would occur during the construction of the monorail and self-propelled rail options. Extracting and hauling construction materials could cause impacts within the park. The monorail and self-propelled rail alternatives could be built on or near the existing road alignment. If these alternatives were near the road, they could encroach into proposed wilderness areas. Resource impacts could also occur as a result of needed expansion of the park's electrical system for the monorail alternative. Maintenance facility requirements would be larger for both the fixed guideway alternatives than for the bus alternatives.

Consistency with Park Service and Regional Planning Goals. The visitor appeal potentially offered by the rail alternatives could support development goals in Cody, Wyoming by increasing visitation demand along the Hayden Valley segment, possibly offsetting the potential diversion of through trips away from the east entrance. The need for construction materials could impact areas outside as well as inside the park. Required upgrades to electrical service in Yellowstone could also impact the surrounding area.

Cost and Cost-Effectiveness. The bus alternatives would have the lowest initial cost and the highest operating cost of the alternatives. The monorail option would be highest in initial cost, with the self-propelled rail alternative falling between the bus and monorail options. Electrification upgrade requirements could increase the estimated cost for the monorail alternative. Costs for each alternative are summarized in table 24.

Implementation. The bus option would be the quickest and easiest to implement. A number of potential suppliers would provide a competitive procurement environment. TWRS or other private companies could operate the proposed service. The other alternatives would require more complex environmental documentation efforts and a longer design and construction period. Each would require specialized expertise and would have a limited number of potential suppliers. Housing would need to be provided for large construction crews over one or two seasons for both the self-propelled rail and monorail options. Housing for operating staff would cost between $1.3 million for the monorail alternative to $3.3 million for the conventional bus alternative.

DUNRAVEN PASS (CANYON TO TOWER)

Impacts Common to All Alternatives

Two alternative transit technologies were considered for VTS service over Dunraven Pass — buses and a cog railway. The alternatives would have similar impacts on

Table 24: Cost Summary for Hayden Valley Alternatives

Cost Element	Conventional Shuttle Bus	Large Shuttle Bus	At-Grade Self-Propelled Rail	Elevated Monorail
Construction and Equipment (millions)	$31.1	$34.3	$348.6	$880.7
Annual Operating and Maintenance (millions)	$5.1	$3.6	$8.6	$5.7
Annual Passengers	1,021,200	1,021,200	1,021,200	1,021,200
Annualized Cost Per Rider	$7.98	$6.80	$36.79	$75.78

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16 percent for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16 percent (of net) for contingencies, 15 percent (of net) for supervision, and 25 percent (of net) for planning.
- The cost of added electrical service to the park for the monorail alternative is not included.

visitor transportation and management and visitor experience.

Visitor Transportation and Management. Replacing private vehicular traffic with a visitor transportation system along this portion of the Grand Loop Road would reduce traffic volumes. However, Dunraven Pass is one of the lower-volume segments of the road. The closure of this section to private vehicular traffic would lengthen trips to all park features except Mammoth from the northeast entrance. The traffic diverted from Dunraven Pass would use the Tower to Mammoth, Mammoth to Norris, and Norris to Canyon segments of the Grand Loop Road, increasing traffic volumes on those segments.

Visitor Experience. VTS service would provide an alternative visitor experience without high volumes of vehicles. The congested character of the roadway would be reduced by eliminating traffic and roadside parking. Visitors would have less freedom to stop and view scenery and wildlife than they now enjoy. However, opportunities for narration and other interpretation would be expanded. Direct human contact with wildlife would be restricted. Both alternatives would cause localized and short-term exposure to noise and engine exhaust from the transit vehicles.

Resource Impacts. The alternatives would benefit wildlife and habitat by reducing vehicular volumes, controlling direct human contact with animals, and eliminating roadside parking. Short-term impacts to wildlife and localized habitat loss would occur during roadway upgrading or railway installation and at staging areas at Tower and Canyon Village. Both alternatives would reduce vehicle emissions associated with reduced traffic volumes. Staging area space requirements would be basically the same for each option.

Consistency with Park and Regional Planning Goals. The alternatives would make access to the northeast entrance more difficult from entrances other than the north entrance. They would reduce the need for law enforcement and resource protection on this segment of the Grand Loop Road.

Implementation. Both options would require environmental documentation for staging area and cog railway construction or upgrading of the road to accommodate the bus based system. Visitor access would be disrupted during the construction of either option.

Evaluation of Alternatives

The following key differences between the bus and cog rail alternatives were identified.

Visitor Transportation and Management. Construction of a cog rail system might require closing the Dunraven Pass segment for a period of time. No other substantive differences in transportation service, impacts, or visitor use management were identified for the alternatives.

Visitor Experience. The cog railway alternative would collect visitors into somewhat larger groups than the bus option. The cog rail option could offer extra visitor appeal and would fit into the mountain and alpine environment of this section of the Grand Loop Road.

Resource Impacts. The cog rail alternative would be more effective in reducing runoff impacts and road edge habitat damage, because vehicles would be confined to a narrow trackway. The cog railway option would require fewer VTS vehicle trips to serve the projected demand, further reducing wildlife conflicts. The cog railway alternative could be constructed on or near the existing road alignment. If located near the road, the cog railway could encroach into proposed wilderness areas. The cog rail alternative would require more space for a maintenance facility.

Consistency with Park Service and Regional Planning Goals. The alternatives would provide similar contributions to long-range goals for Yellowstone. The visitor appeal of the cog rail alternative could offset the potential diversion of travelers from the northeast entrance.

Cost and Cost-Effectiveness. The cog rail alternative would be more costly to construct and would have substantially higher costs per passenger than the bus alternatives. Table 25 summarizes the costs for each of the Dunraven Pass VTS alternatives.

Implementation. The implementation of the cog rail option would be more complex and time consuming, requiring five years or more for environmental documentation, design, and construction. Specialized expertise would be required for the design, construction, and operation of the cog railway alternative, while the bus options could be implemented by TWRS or other contractors. Housing costs for operating staff would be $2.5 million for the bus alternative and $1.6 million for the cog railway.

CANYON AREA SHUTTLES

Impacts Common to All Alternatives

Three options, two serving the south rim of the Grand Canyon of the Yellowstone and one serving the north rim, were identified for the Canyon area. The impacts of the alternatives are similar, although they occur at different locations. The similar aspects of the options are discussed below.

Visitor Transportation and Management. The alternatives would reduce the presence of vehicles in the Canyon area by concentrating visitor parking in existing developed areas and by eliminating private vehicular traffic along portions of the rim. Visitation could be more evenly spread over time with the use of visitor transportation systems for access to viewpoints. The capacity of the VTS service could be matched to viewpoint carrying capacities. A sequence of visitor activities could be developed, helping to spread out visitation peaks and reduce crowding. Some increases in congestion could occur at the most heavily used parking areas.

Visitor Experience. The visitor experience of the Canyon area could be improved by reducing the presence of vehicles near the rim. Short walking trips between VTS stops would be encouraged, offering visitors an alternative experience from the typical auto tour. Visitors would be concentrated into groups, but peak overloads and crowding could be reduced, improving visitor enjoyment. Visitors could be assured access to all viewpoints, eliminating current problems with inadequate parking

Table 25: Cost Summary for Dunraven Pass Alternatives

Cost Element	Conventional Shuttle Bus	Large Shuttle Bus	Cog Rail
Construction and Equipment (millions)	$23.1	$29.7	$362.0
Annual Operating and Maintenance (millions)	$3.8	$3.2	$6.9
Annual Passengers	657,700	657,700	657,700
Annualized Cost Per Rider	$9.14	$9.24	$55.87

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16 percent for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16 percent (of net) for contingencies, 15 percent (of ne for supervision and 25 percent (of net) for planning.
- Costs to rehabilitate the existing road to accommodate bus use are not included in the shuttle bus alternatives.

supply. The time required to see the rim could be increased for many visitors with the VTS alternatives.

Resource Impacts. Each of the alternatives would reduce the habitat impacts now associated with pull off parking and social trails. Interpretive programs on-board the transportation system could be used to encourage visitor behavior that would limit resource impacts. Vehicle emissions would be reduced, and localized air quality could be marginally improved. Maintenance facility space requirements would be similar for each alternative.

Consistency with Park Service and Regional Planning Goals. The alternatives could reduce the need for traffic and parking enforcement and resource protection activities in the Canyon area.

Cost and Cost-Effectiveness. The costs of all alternatives would be affected by the availability of vacant parking for use by visitors riding the VTS alternatives. The high levels of demand in the area would require a substantial investment in staging area improvements and in vehicles and operating resources under all the alternatives.

Implementation. All alternatives would require environmental documentation and a development concept plan for the Canyon area to define how the various existing and expanded parking facilities should relate to the visitor facilities serving the area.

Evaluation of Alternatives

The major differences among the alternatives are discussed below.

Visitor Transportation and Management. Access to the south rim could be disrupted during construction of a monorail system. The monorail option may also be difficult to operate in snowy or other extreme weather conditions.

Visitor Experience. The visitor experience that would be offered by the two bus alternatives would be very similar. Intermittent noise and exhaust fumes would be potential drawbacks of the bus options. The bus options would not have an appreciable impact on views, except for removing private vehicles from near the Canyon rim. The monorail option would offer unique viewing perspectives and might offer extra visitor appeal. On the other hand, the elevated guideway of the monorail option could disrupt foreground views and long-range vistas of the rim and canyon. The monorail would require vertical circulation at stations, lengthening the overall travel time for this alternative.

Resource Impacts. The monorail alternative would require the extraction and hauling of construction materials, and emissions and noise from equipment would be present during construction. Short-term habitat disruption and wildlife disturbance would also occur. Resource impacts could also occur because of electrical system upgrades which may be required to support a monorail system. Once installed, the system would isolate visitor activity from the surrounding environment. Staging area requirements would be somewhat larger for a north rim transit alternative, because there would be a higher estimated passenger demand compared to the south rim. Existing parking lots on the south rim identified for staging area use would also provide a larger portion of the required supply then does the surplus parking identified at Canyon Village for north rim requirements.

Consistency with Park and Regional Planning Goals. No substantive differences among the alternatives were identified for this evaluation category.

Cost and Cost-Effectiveness. The alternatives are all potentially cost-effective because of the opportunity to serve high volumes of visitors. The monorail option would be the most costly to implement, but would have low operating costs. A breakdown of costs are presented in table 26 for the Canyon area VTS alternatives.

Implementation. The monorail option would be the most time consuming and complex alternative to implement. More extensive environmental documentation would be required, along with specialized expertise for design, construction, and operations. The park concessioner could implement the bus alternatives, and many suppliers would create a competitive procurement environment. A limited number of suppliers would be available for the monorail option. Housing for operating staff would cost $0.6 million for the north rim shuttle, $0.5 million for the south rim bus option, and $0.2 million for the monorail.

OLD FAITHFUL/GEYSER BASIN SHUTTLE

Conventional and articulated bus VTS alternatives were identified for this voluntary shuttle service. The following impacts were identified for VTS service to the thermal features north of Old Faithful.

Visitor Transportation and Management. High volumes of traffic leave the Old Faithful area after each eruption. The provision of an alternative visitor activity, based at Old Faithful, could help to spread the volume of traffic more evenly over time. This alternative would provide an effective means of visitor access to thermal areas that would not be directly accessible if the Old Faithful to Madison segment of the Grand Loop Road was relocated in the future. The flows of visitors to and around the geyser basin could be organized and distributed more evenly over time.

Visitor Experience. This alternative would provide visitors with a different type of experience from the typical auto tour through the park. Access to individual thermal sites could be made more convenient by eliminating the need to search for parking. Visitors would be grouped in vehicles, but crowds that now occur after Old Faithful eruptions could be distributed over time, reducing crowding at individual sites. Crowding could occur in the staging areas since a surge of riders might arrive to use the visitor transportation system after Old Faithful eruptions. This option would reduce the convenience of visiting the thermal sites for visitors making through trips along the Norris to Old Faithful Grand Loop segment. The buses used in this option could produce temporary and localized emissions and noise impacts on visitors.

Resource Impacts. This alternative would reduce sensitive thermal feature damage associated with roadside and spill-over parking and social trails. It would also reduce impacts on roadside habitat. No overall reduction in vehicle travel would occur with this alternative. The combined space requirements for a staging area and maintenance facility would be just under 7 acres.

Table 27: Cost Summary for Old Faithful to Geyser Basin Alternatives

Cost Element	Conventional Shuttle Bus	Articulated Shuttle Bus
Construction and Equipment (millions)	$12.2	$16.1
Annual Operating and Maintenance (millions)	$2.6	$2.3
Annual Passengers	830,500	830,500
Annualized Cost Per Rider	$4.39	$4.48

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% percent for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision, and 25 percent (of net) for planning.

Hayden Valley (Lake to Canyon)

This alternative would offer an opportunity to reduce vehicle impacts on wildlife and fragile habitat in an especially sensitive area of Yellowstone. Development of a visitor transportation system would provide visitors a unique and pleasant way to experience wildlife in a more natural setting. The monorail alternative would offer the ability to isolate visitor use from the environment, minimizing the impact of visitor use on the resources of the Hayden Valley. The monorail also would offer visitors a unique and exciting viewing perspective. Although it would place a significant structure within the landscape, the majority of visitor viewing would be from the VTS vehicles, minimizing the actual visual impact of the system. The monorail alternative would be substantially more costly than the other Hayden Valley VTS options.

Dunraven Pass (Canyon to Tower)

This segment of the Grand Loop Road has relatively low visitation. The condition of the road is poor and maintenance is difficult. The development of a cog railway system along the current road alignment would address some of the existing maintenance concerns. The visitor appeal of such a system could increase visitation and improve the cost-effectiveness of the cog railway option. Bus service along this road segment would require road improvements and continued maintenance. The ridership potential of the bus alternatives is probably lower than that for the cog railway due the visitor appeal of the cog railway system is likely to have.

Canyon Area Shuttles

A visitor transportation system in this compact activity area would be relatively less costly than in other locations because of the short system lengths required. The primary benefit of visitor transportation systems in the Canyon area would be removing the influence of private vehicle traffic and parking from the scenic areas along the rims. Visitor access to viewpoints could be made more reliable by eliminating the need for visitors to search for parking spots at individual viewpoints. VTS service would encourage short visitor walks between viewpoints and would offer a different character of experience from the typical Yellowstone auto tour. The monorail option would reduce noise and VTS emissions, but could disrupt views of and from the rims.

Old Faithful/Geyser Basin Shuttle

This alternative could reduce the peaking of visitor traffic that occurs after Old Faithful eruptions. Roadway congestion in the Old Faithful area, on the Grand Loop Road, and at the thermal features near Old Faithful could be reduced by offering a visitor experience that would lengthen some visitors' stays in the area. The requirement for vehicular parking in the Old Faithful area would increase due to longer average stays. The current difficulty of finding parking spaces at the various thermal features along the roads north of Old Faithful would be eliminated. The access to the thermal features would be more difficult for through travelers with a limited amount of time to view the park.

EVALUATION SUMMARY CHART

West Yellowstone to Grant Village (via Old Faithful) VTS Alternative

	Voluntary Shuttle Bus
Visitor Transportation and Management	• Encourages use of lodging and visitor facilities outside park • Encourages reduction in private vehicle use • Not convenient for through travelers • Could encourage more visitation to Old Faithful by providing additional access from West Yellowstone • Could reduce traffic peaks after Old Faithful eruption • May encourage new use patterns • Ridership is likely to be low
Visitor Experience	• Provides a means of visiting park without private vehicle • Lengthens stay for through travelers • Reduces Personal freedom to experience park • Gathers visitors into groups • Offers opportunity for narration/interpretation
Resource Impact	• Minor reduction in traffic and emissions • Potential to reduce traffic related disturbances to wildlife and roadside habitat • Offers opportunity to provide advance interpretation to reduce improper use of resources • Space requirements for parking and passenger loading facilities = 2.3 acres (West Yellowstone), 1.4 acres (Grant Village), 1,920 s.f. (Old Faithful) • Maintenance facility requirements = 21,966 square feet
Consistency With Park Service and Regional Planning Goals	• Encourages commercial development in West Yellowstone • Encourages development of visitor support services outside park • Requires staging area in West Yellowstone
Cost and Cost Effectiveness	• Cost effectiveness depends on ridership level • Private sector could provide West Yellowstone staging area
Implementation	• Coordination with private sector and West Yellowstone required • Relatively easy to implement • Concessioner could operate • Large number of vehicle suppliers • Number of transportation employees = 46

EVALUATION SUMMARY CHART

Hayden Valley VTS Alternatives

	Bus Alternative	Self-Propelled Rail Alternative	Elevated People-Mover Monorail Alternative
Visitor Transportation and Management	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens time of through trips between east and west entrances and north and east entrances • May increase traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens through trips between east and west entrances and north and east entrances • May increase private vehicular traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas • May require closure of access to area during construction	• Lengthens access time from Mammoth and Tower to Lake by private vehicle • Lengthens access time from Lake and West Thumb to Canyon, Norris, and Tower by private vehicle • Lengthens through trips between east and west entrances and north and east entrances • May increase private vehicular traffic between Lake, West Thumb, and Madison Jct. • Provides opportunity to control visitor access to sensitive areas • Difficult to operate in snow and ice • Vertical circulation required at stations • May require closure of access to area during construction
Visitor Experience	• Provides alternative means of viewing a segment of Grand Loop • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • Eliminates/reduces opportunity for close-range wildlife contact • Less personal freedom to experience park • Visitors gathered in groups • Buses produce noise and fumes	• Provides alternative means of viewing a segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • May provide visitor appeal • Could be consistent with wilderness character • Diesel engine produces noise and fumes • Visitors gathered in large groups • Eliminates/reduces opportunity for direct close-range wildlife contact • Less personal freedom to experience park	• Provides alternative means of viewing a segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Reduces convenience for some trips • Could lengthen stays in park • May provide visitor appeal • Offers unique viewing perspective • Could conflict with wilderness character • Could affect landscape views from points off guideway • Electrification system affects views along power line route • Very low noise level • Eliminates/reduces opportunity for close-range wildlife contact • No exhaust • Visitors gathered in large groups • Introduces urban element into landscape • Less personal freedom to experience park • On-demand stops are not possible
Resource Impact	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence in critical habitat area • Reduces road edge damage and social trails • Reduces vehicle travel and emissions • Some habitat loss at staging areas and maintenance base • Short-term wildlife disturbance during construction of staging areas • Conventional bus space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.3 acres (Canyon) • Large bus space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Conventional bus maintenance facility requirements = 2.0 acres • Large bus maintenance facility requirements = 1.5 acres	• Major reduction in vehicle/wildlife conflicts • Reduces wildlife stress from human presence in critical habitat area • Eliminates road edge damage and reduces social trail formation • Changes historic use of Grand Loop Road segment • Reduces vehicle travel and emissions • Wildlife disturbance during construction of staging areas and alignment • Alignment could be affected by archeological sites, thermal features, and seismic activity • Construction material extraction and hauling impacts • Some habitat loss at staging areas, maintenance base and along route • Road could be removed/reclaimed • Space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Maintenance facility requirements = 2.0 acres	• Eliminates vehicle/wildlife conflicts • Reduces wildlife stress from human presence in critical habitat area • Eliminates road-edge damage and reduces social trail formation • Changes historic use of Grand Loop Road segment • Reduces vehicle travel, eliminates emissions • Wildlife disturbance during construction of staging areas and alignment • Alignment could be affected by archeological sites, thermal features, and seismic activity • Construction material extraction and hauling impacts • Road could be removed/reclaimed • Some habitat loss at staging areas, maintenance base and along route • Space requirements for parking and passenger loading facilities = 10.1 acres (Lake), 6.4 acres (Canyon) • Maintenance facility requirements = 2.0 acres
Consistency With Park Service and Regional Planning Goals	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Novelty value could increase visitor use potential if road left in place • Construction materials extraction could affect areas outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment if road left in place	• Could affect visitor traffic through Cody, Wyoming, Cooke City, and Silvergate, Montana • Novelty value could increase visitor use potential • Electrification upgrades could affect areas inside and outside park • Construction materials extraction could affect areas inside and outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel along road segment if road left in place
Cost and Cost Effectiveness	• Least costly to implement • Highest operating costs	• High cost to implement • Moderate operating costs	• Most costly to implement • Lowest operating costs • Electrification upgrades could increase cost
Implementation	• Requires environmental documentation for staging areas and socioeconomic impacts • Relatively short time required to implement • Large number of potential suppliers • Number of transportation employees = 17 (conventional bus) • Number of transportation employees = 118 (large bus)	• Requires extensive environmental documentation for staging areas, alignment and socioeconomic impacts • Requires five years or more to plan, design and construct • Requires specialized expertise for design and construction • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 98	• Requires extensive environmental documentation for staging areas, alignment and socioeconomic impacts • Requires five years or more to plan, design and construct • Requires specialized expertise for design, construction, operations and maintenance • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 60

EVALUATION SUMMARY CHART

Dunraven Pass VTS Alternatives

	Bus Alternatives	**Cog Railway Alternative**
Visitor Transportation and Management	• Diverts traffic from low volume portion of Grand Loop Road • Lengthens trips from northeast entrance to all locations except Mammoth • May increase traffic between Tower and Mammoth, Mammoth and Norris and Norris and Canyon	• Diverts traffic from low volume portion of Grand Loop Road • Lengthens trips from northeast entrance to all locations except Mammoth • May increase traffic between Tower and Mammoth, Mammoth and Norris and Norris and Canyon • May require closure of access to area during construction
Visitor Experience	• Provides alternative means of viewing segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Eliminates/reduces opportunity for direct wildlife viewing • Less personal freedom to experience park • Visitors gathered in groups • Buses produce noise and fumes	• Provides alternative means of viewing segment of Grand Loop Road • Reduces traffic and roadside parking • Provides opportunity for narration and interpretation • Eliminates/reduces opportunity for direct wildlife viewing • Less personal freedom to experience park • Visitors gathered in large groups • Cog rail vehicles produce noise and fumes • May provide visitor appeal • Has wilderness character
Resource Impact	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence • Reduces road edge damage and social trails • Reduces vehicle travel and emissions • Some habitat loss at staging areas and along improved roadway • Short-term wildlife disruption during roadway upgrading and staging area construction • Conventional bus space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Large bus space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Conventional bus maintenance facility requirements = 1.5 acres • Large bus maintenance facility requirements = 1.5 acres	• Reduces vehicle/wildlife conflicts • Reduces wildlife stress from human presence • Eliminates road edge damage and reduces social trails • Reduces vehicle travel and emissions • Road could be removed/reclaimed • Some habitat loss at staging areas and along railway • Construction material extraction and hauling impacts • Short-term wildlife disruption during railway and staging area construction • Space requirements for parking and passenger loading facilities = 6.9 acres (Tower), 4.0 acres (Canyon) • Maintenance facility requirements = 1.9 acres • Unknown response of wildlife to crossing rails
Consistency With Park Service and Regional Planning Goals	• Could affect visitor use at east and northeast entrances • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel	• Could affect visitor use at east and northeast entrances • Material extraction could affect areas outside park • Reduces need for traffic enforcement and resource protection • Facilitates administrative travel if road left in place
Cost and Cost Effectiveness	• Requires repair and upgrade of road • Least costly to construct • Higher operating cost	• High construction cost for railway • Lower operating cost than buses
Implementation	• Requires environmental documentation for staging areas • Shorter time to implement • Large number of potential suppliers • Concessioner could operate • Road construction crew housing required • Number of transportation employees = 130 (conventional bus) • Number of transportation employees = 10[illegible] (large bus)	• Requires environmental documentation for staging areas and railway • Requires five years or more to plan, design and construct • Requires specialized expertise for design, construction, operation and maintenance • Construction crew housing required • Small number of potential suppliers • Number of transportation employees = 82

EVALUATION SUMMARY CHART

Canyon Area VTS Alternatives

	North Rim Shuttle Bus	South Rim Shuttle Bus	South Rim People - Mover
Visitor Transportation and Management	• Eliminates private vehicle traffic on north rim drive • Concentrates visitor parking at Canyon Village • Could increase congestion in Canyon Village area • Spreads visitor demand at north rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed	• Eliminates private vehicle traffic on south rim drive beyond Uncle Tom's Parking lot • Eliminates parking at Artist Point • Spreads visitor demand at South Rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed	• Eliminates private vehicle traffic on south rim drive beyond Uncle Tom's Parking lot • Eliminates parking at Artist Point • Spreads visitor demand at south rim over time • Allows transportation access to be matched to viewpoint carrying capacities • Allows sequence of visitor activities to be programmed • Difficult to operate in snow • May require closure of access to area during construction
Visitor Experience	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Removes visual disruption of parking near rim • Buses could produce noise and fumes	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Removes visual disruption of parking near rim • Buses could produce noise and fumes	• Reduces traffic and roadside parking • Encourages short walking trips between viewpoints • Concentrates visitors into large groups • Increases time required to view rim • Eliminates access problems related to inadequate viewpoint parking • Offers unique viewing perspective • May disrupt views from points away from guideway • Removes visual disruption of parking near rim • Electrification system affects views from points along power line route • May provide visitor appeal • Requires vertical circulation at stations • Introduces urban element into environment • No exhaust
Resource Impact	• Reduction in roadside impacts from social pull-offs • Reduces vehicle emissions • Space requirements for parking and passenger loading facilities = 6.3 acres • Maintenance facility requirements = 15,539 square feet	• Reduction in roadside impacts from social pull-offs • Reduces vehicle emissions • Space requirements for parking and passenger loading facilities = 2.3 acres • Maintenance facility requirements = 12,637 square feet	• Reduction in roadside impacts from social pull-offs • Eliminates vehicle emissions and noise along rim • Material extraction and hauling for construction • Temporary noise, emissions and disruption during construction • Areas of habitat impact along alignment • Isolates visitor activity from surrounding environment • Space requirements for parking and passenger loading facilities = 2.4 acres • Maintenance facility requirements = 11,778 square feet
Consistency With Park Service and Regional Planning Goals	• Reduces need for traffic patrols and resource protection along rim	• Reduces need for traffic patrols and resource protection along rim	• Reduces need for traffic patrols and resource protection along rim • Novelty value could increase visitation demand in Canyon area • Electrification upgrades could affect areas inside and outside of park
Cost and Cost Effectiveness	• Requires parking expansion at Canyon Village and purchase of vehicle fleet	• Requires parking area expansion and purchase of vehicle fleet	• Requires parking expansion and guideway construction • Most costly to implement
Implementation	• Requires environmental documentation for parking expansion • Multiple suppliers • Concessioner could operate • Relatively short implementation time • Number of transportation employees = 31	• Requires environmental documentation for parking expansion • Multiple suppliers • Concessioner could operate • Relatively short implementation time • Number of transportation employees = 27	• Requires environmental documentation for parking expansion and guideway • Limited number of suppliers • Requires specialized skills for design construction, operation and maintenance • Five years or more required to plan, design and construct • Number of transportation employees = 12

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EVALUATION SUMMARY CHART

Old Faithful/Geyser Basin VTS Alternatives

	Shuttle Bus Service
Visitor Transportation and Management	• Provides visitor access to Geyser Basin if Grand Loop relocated to Fountain Freight Road • Reduces traffic surge along Grand Loop Road after Old Faithful eruptions • Organizes visitor flows in geyser area
Visitor Experience	• Provides alternative visitor experience from auto touring • Eliminates need to search for parking at geyser viewing areas • May reduce crowding of visitors at use areas near Old Faithful • Less convenient for through travellers • Facilitates hiking between shuttle stops • Buses could produce localized fumes and noise
Resource Impact	• Reduces roadside damage and social trails from informal parking • Reduces auto travel in thermal areas • Allows removal and reclamation of a segment of road, and reclamation of wetlands • No overall reduction in vehicle travel or emissions • Conventional bus space requirements for parking and passenger loading facilities = 8.3 acres • Articulated bus space requirements for parking and passenger and loading facilities = 8.3 acres • Conventional bus maintenance facility requirements = 32,050 square feet • Articulated bus maintenance facility requirements = 33,481 square feet
Consistency With Park Service and Regional Planning Goals	• Road through thermal area must be maintained and/or upgraded to accommodate bus traffic • Eliminates portions of existing road and reclaims wetlands • Facilitates relocation of Grand Loop Road to Fountain Freight Road
Cost and Cost Effectiveness	• Cost-effectiveness depends on actual ridership response • Relatively low initial cost
Implementation	• May require environmental documentation if parking expansion needed at Old Faithful • Large number of suppliers • Concessioner could operate • Relatively short time to implement voluntary system • Mandatory system can not be implemented without relocation of Grand Loop Road • Number of transportation employees = 63 (conventional bus) • Number of transportation employees = 54 (articulated bus)

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IMPLEMENTATION ISSUES

The next step in implementing improved visitor transportation systems at Yellowstone National Park would be to prepare an initial program management plan. This plan would set forth the planning, design, and environmental compliance steps necessary to define preferred solutions in each of the potential VTS service areas. This plan would also identify a process to confirm the selection of preferred alternatives in each area and lay out a process for identifying the necessary funding for the required construction projects and a financing plan for each. The plan would include a schedule and would identify responsibilities for each stage of the implementation program, beginning with more in-depth planning studies and culminating with the construction of new facilities and operation of the new systems.

The following paragraphs identify the key elements of a program management plan for developing visitor transportation systems in Yellowstone. The plan elements follow the basic approach used in the development of federally funded urban transit systems and could form the basis of a standard NPS process for identifying and evaluating VTS needs servicewide. Similar steps would be required in each VTS service area, with varying levels of complexity.

CONCEPTUAL ENGINEERING/ ALTERNATIVES ANALYSIS

This initial stage of the implementation process would compile information on existing topography, soils, environmental baseline conditions, and other material to support the conceptual design of each alternative and the identification of environmental impact concerns. Plan and profile drawings would be developed for any guideway alternatives, needed roadway improvements would be identified for bus alternatives, and a detailed operating plan would be developed for each. The location, size and type of visitor facilities, maintenance facilities, and other features identified in this study would be refined and conceptual layouts produced. Operational tests of alternative buses should be undertaken to identify the most appropriate models for use on Yellowstone's roads.

Conceptual cost estimates would be compared to identify the most cost-effective options. The environmental impacts of the construction and operation of each alternative would be estimated and compared, along with assessments of each alternative's contribution to visitors' experience of the park and the achievement of park objectives.

The relationship between the transportation of visitors and the carrying capacity of park resources is an extremely important element of the evaluation of the alternatives. Carrying capacity should be considered from the perspective of physical damage to natural and cultural resources and from the viewpoint of visitor experience. The contribution of each transportation alternative to the experience in Yellowstone also would be critical to the ultimate choice among the available options. The need to modify existing visitor facilities and provide improved information, orientation, and interpretive services would be defined in detail at this stage of the development process.

The product of this step in the process would be a definition of the preferred alternative for each activity area in the park, a more definitive cost estimate for the VTS alternatives, and preliminary financing plans for each area. This information could be used to compare proposed improvements at Yellowstone with other service-wide needs to develop priorities for NPS funding allocations.

Depending on the alternatives selected to address Yellowstone's visitor transportation needs, additional design and environmental compliance effort might be required. The remaining portion of this section describes possible implementation steps for fixed-guideway transit systems that might be selected for implementation in Hayden Valley, Dunraven Pass, or the Canyon area. Bus alternatives that would use existing park roads would not require the same implementation steps.

PRELIMINARY ENGINEERING AND ENVIRONMENTAL DOCUMENTATION

In this step of the process, the design of the proposed improvements would be developed in more detail to confirm the alignment, profile, requirements for structures, and the location and design of fixed facilities. About 30% of the design work needed to produce construction contract documents would be completed at this stage of the project. Performance specifications would be prepared for the equipment needed to operate the system.

The greater level of detail available at this stage of the design process would allow environmental impacts of the proposed improvement to be determined with confidence, and would permit mitigation measures to be identified and included in the design. Cost estimates prepared at this stage would have a greater level of confidence.

FINAL DESIGN, CONSTRUCTION, OPERATIONS

At this stage of the project development process, a number of options would be available for moving the project forward if the necessary funding were secured. Adequate project definition would now be available to turn all or portions of the project over to a contractor or set of contractors, if that approach offered significant advantages with respect to cost or implementation time. The implementation strategy could follow one of four models:

- Traditional Model
- Design/Build Model
- Turnkey Model
- Super-Turnkey Model

Traditional Project Implementation

The traditional approach to developing public works projects has involved separating the final design and construction tasks from each other. Construction documents and detailed equipment specifications for all elements of the project are prepared under the direction of the project owner. The project is split into packages and competitive bids are taken for constructed facilities and equipment. In some cases, a single, all encompassing general contract is bid, but more often a number of individual elements of the project are bid separately. The owner or a representative of the owner is then responsible for coordinating the work of the individual contractors.

Design/Build

The design/build model for project development involves splitting the project into distinct packages at the completion of preliminary engineering. Competitive bids are taken for the completion of design and construction of fixed facilities based on the preliminary engineering design and for the design and manufacture of equipment based on a performance specification. This approach potentially allows the contractors to contribute to the design process, perhaps identifying cost-saving design changes. This approach also internalizes any conflicts between the design intent and any unexpected conditions that are revealed during construction within a single contracting entity. The owner is still responsible for coordinating the activities of the different contractors to deliver a completed project.

Turnkey

The turnkey contracting model involves taking competitive bids on a single contract package which includes all the elements necessary to deliver the completed project. The turnkey contract also may include the operation of the completed project for a specified number of years. The presumed advantage of this approach is that a single point of responsibility is identified for delivering a completed, successful project. The risk of coordinating the elements of the project is removed from the owner and placed on the contractor. Turnkey contracts usually are based on a firm fixed price for which the contractor agrees to deliver the finished project. While risk is transferred to the contractor, the owner gives up a good deal of control over the process in this model.

Super-Turnkey

The super-turnkey model can be used if the contractor has a potential ownership interest in all or portions of the system. Within the National Park Service, the development of fixed facilities within park units by concessioners is a form of super-turnkey project implementation. In the case of a VTS project, a park concessioner could undertake the project on a super-turnkey basis. The concessioner could retain ownership of the system for a specified number of years and have the rights to operate the system, collecting fares and using the system to support other concession services. The Park Service could share in system revenues through provisions in the super-turnkey contract. Alternatively, the Park Service could agree to subsidize the concessioner operation of the system to keep user costs low.

Turnkey and super-turnkey project implementation has received a great deal of interest in the last few years. Transit proposals involving these innovative approaches include systems in Minneapolis - St. Paul, Newark, Houston, and Honolulu. To date, a transit project has not been completed using the turnkey or super-turnkey approach.

In Yellowstone, each of the available approaches has advantages and drawbacks. At the feasibility study stage, it is not necessary to identify a preferred approach. If a VTS project proceeds into preliminary engineering, a formal evaluation of the available implementation strategies should be made. Factors to consider in choosing an approach include the cost of the project, the degree of risk and liability and the way in which risk is shared among the parties, the degree of control the Park Service can exercise over the project, the time schedule for completion of the project, the quality of the resulting system, the ability of the Park Service to manage the project, and other factors specific to Yellowstone National Park.

FUNDING OPTIONS

The potential funding sources for VTS improvements at Yellowstone include annual appropriations as part of the park's operating budget, programs within the Intermodal Surface Transportation Efficiency Act, a new and as yet undefined NPS program for visitor transportation systems, the park visitors (in the form of entrance fees or fares), and the private sector. The private sector's involvement would be predicated on the potential to recover their investment through user charges and/or subsidies. Indirect revenue to concessioners generated by increased visitation is a potential source of additional funding for VTS development or operation.

The annualized cost of the Yellowstone VTS alternatives ranges from $2.7 million for a bus system between West Yellowstone and Grant Village/West Thumb, to $77.5 million for a monorail system through Hayden Valley. The likelihood of securing funding for fixed guideway alternatives in the Yellowstone is low, considering current policies and funding sources unless the private sector were allowed to collect fares high enough to support a turnkey implementation of one of the systems.

At present, a servicewide policy regarding VTS development and funding is not in place. The need for such a policy is evident from the results of this study and the companion efforts at Yosemite National Park and Denali National Park and Preserve. The funding required to support any of the proposed alternatives is beyond the current resources of the National Park Service and Yellowstone National Park. No formal VTS program presently exists to address visitor transportation needs at Yellowstone or other units of the national park system. Decisions at Yellowstone and other parks are made on an individual basis, considering the availability of funds and competing needs in each park. At present, no mechanism exists to allow the private sector to recover the costs of VTS development. Several opportunities for turnkey implementation of transportation systems have been identified and could go forward if a means of collecting reasonable user fees through entrance charges could be developed.

The movement of visitors is one of the most critical aspects of the management and enjoyment of the nation's park units. This study and other ongoing work in the parks have identified the importance of the Park Service's role in planning for and managing visitor use. Visitor transportation systems offer a means to manage visitor movements while enhancing the interpretation of park resources and enjoyment of the visitors. Systems that complement private vehicle travel are most appropriate in areas of high use and special resource sensitivity, like Yellowstone.

Volume I of the *Alternative Modes Feasibility Study* contains a more in-depth discussion of these issues and VTS program needs within the National Park Service. It is apparent that alternative transportation modes are not only a feasible option to private vehicle travel, but a superior choice for visitors and the National Park Service in a number of park settings.

APPENDIX A: Record of Roadway Features and Parking Facilities

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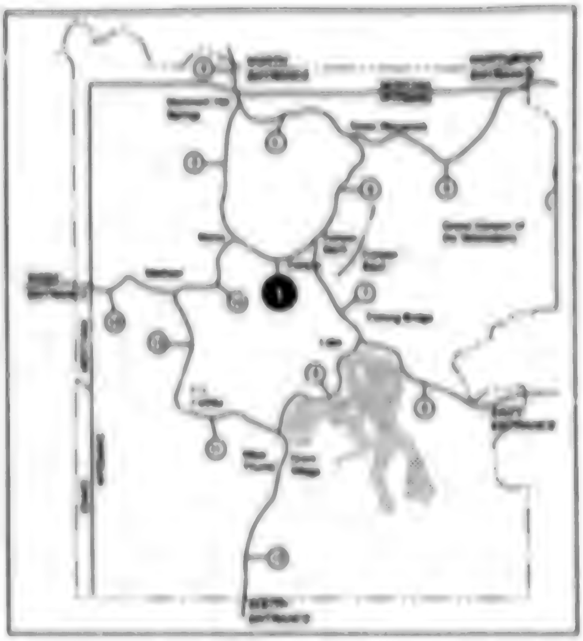
YELLOWSTONE NATIONAL PARK RECORD OF ROADWAY FEATURES AND PARKING FACILITIES

ROAD SEGMENT NO. 1

Norris Junction to Canyon Village
(Eastbound)
October 28, 1992



Note: Blank boxes indicates information not obtained

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
1.4		X	Pull out		X	2	Gibbon River access
1.6	X		Loop drive	X		50	Gated at both ends; unstriped
1.9		X	Service Road				Access to gravel pit
2.1		X	Pull out		X	2	Poor condition
2.4		X					Substation access and powerline
2.7		X	Loop drive	X			Virginia Cascades Drive entry (one way drive)
3.1		X	Pull out		X	2	Poor condition
3.2		X	Pull out	X	X	10	
3.6							Lots of informal pull out action, evidence of driving off shoulder on both side
3.8	X		Pull out	X		3	
3.9		X	Pull out	X		5	
4.1–4.2	X	X	Pull out	X		24	Significant burned area
4.5	X		Service road				
4.6	X		Trailhead	X		12+	Ice Lake
4.8		X	Pull out		X	2	Virgina Cascades Drive exit

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
5.0			Pull out			18	
5.6	X		Pull out			15	Lodgepole pine vista
6.1		X	Pull out		X	3	
6.4		X	Pull out		X	3	
6.8	X		Pull out	X		20	
7.7		X	Pull out		X	2	
8.0		X	Pull out	X		7	
8.2		X	Pull out		X	3	
8.5	X	X	Pull out		X	6	
8.9		X	Pull out		X	7	
9.0		X	Service road				
9.4	X		Loop drive	X		18	North Grebe Lake access
10.1	X		Pull out		X	[illegible]	
10.4	X		Pull out	X		8	
12.7	X		Pull out	X		8	
12.9–13.1	X	X	Pull out		X		Nearly continuous, informal/ wildlife pull outs along shoulder. Service road n side.
13.1							End of roadway segment

YELLOWSTONE NATIONAL PARK
ROAD FEATURES AND PARKING FACILITIES
SEGMENT NO. 2

MAMMOTH HOT SPRINGS TO NORRIS GEYSER BASIN
(SOUTHBOUND)
AUGUST 12 AND AUGUST 16, 1992

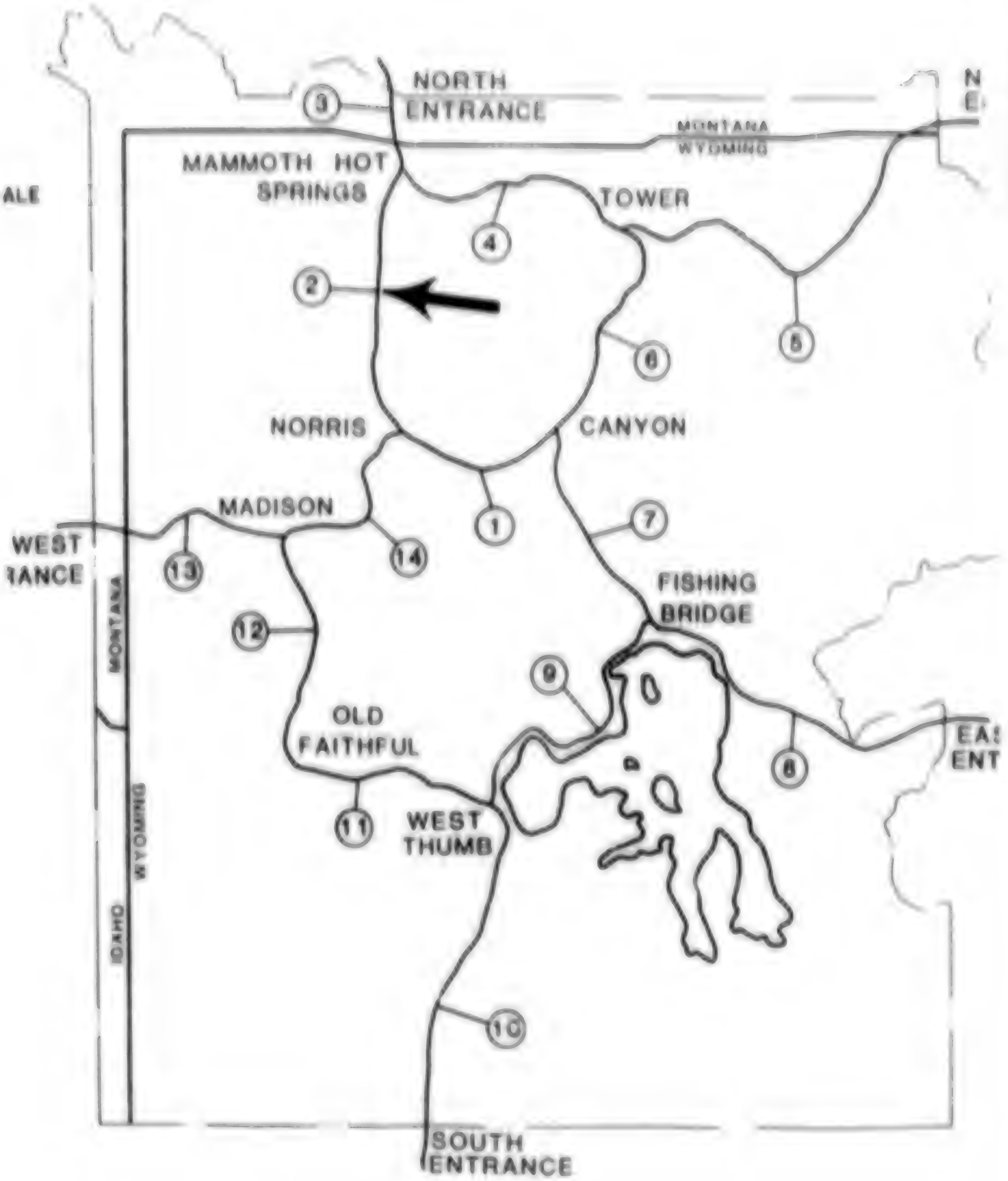
Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
0.6	X		Parking Area		X	50	Mammoth Horse Corrals
1.0	X		Pull Out			4	
1.7		X	Pull Out			4	
1.8		X	Pull Out			10	
2.1		X	Pull Out			50	At Access to Upper Terrace Parking Area
2.2	X		Pull Out			10	
2.5	X		Pull Out			5	
2.8		X	Pull Out			1	
3.2	X		Pull Out			10	"The Burn Mosaic" Exhibit
3.6		X	Pull Out			7	
4.5		X	Pull Out			5	
4.7			Pull Out			10	"Bridging The Golden Gate" Exhibit
4.8			Pull Out			3	
4.9			Trail Head			5	
5.0		X	Pull Out			10	Swan Lake Flat
5.3	X		Pull Out			5	
5.6		X	Pull Out			10	
5.8			Pull Out			20	Roadside Exhibit
6.3		X	Pull Out			15	

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
6.7	X		Pull Out			2	
6.9	X		Pull Out			5	
8.1			Pull Out			3	Signed "Sheepeater Cliffs"
9.8		X	Pull Out			3	
9.9		X	Pull Out			2	
10.5		X	Pull Out			5	
10.7		X	Pull Out			30	Signed "Willow Park" and "Watch For Moose"
10.8		X	Pull Out			10	
11.0		X	Pull Out			10	
11.2		X	Loop Drive			5	
11.5			Loop Drive			10	With Exhibit
11.8		X	Pull Out			2	
12.0			Picnic Area				Apollinaris Springs Picnic Area
12.0		X	Pull Out			3	
12.2			Pull Out			1	
12.4			Trail Head			7	
12.8	X		Pull Out			2	
13.4	X		Pull Out			20	Obsidian Cliff Exhibit Area
14.3		X	Pull Out			3	
14.5			Picnic Area				Beaver Lake
14.5		X	Pull Out			10	
14.8			Pull Out			5	

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
15.4		X	Pull Out			1	
15.6		X	Trail Head			5	
15.9		X	Pull Out			15	Three Indv. Pull Outs
16.2		X	Pull Out			4	
16.4		X	Pull Out			1	
16.5		X	Pull Out			5	
16.6			Pull Out			5	
16.9		X	Pull Out			3	Signed "Roaring Mountain"
17.0	X	x	Pull Out			35	
17.2		X	Pull Out			2	
17.3		X	Pull Out			1	
17.4		X	Pull Out			15	North Twin Lake
17.7		X	Pull Out			5	South Twin Lake
18.3		X	Pull Out			5	
18.5		X	Pull Out			5	
18.8		X	Pull Out			1	
19.0		X	Pull Out			3	
19.1		X	Pull Out			3	
19.3		X	Pull Out			5	Nymph Lake
19.7		X	Pull Out			3	Frying Pan Lake
19.9		X	Pull Out			7	
20.4		X	Loop Drive			15	
21.2	X		Pull Out			5	Turn for Ranger Museum, Norris Campground

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
21.4			Pull Out			40	Exhibit, "Cavalry in Yellowstone"
22.6							End of Segment



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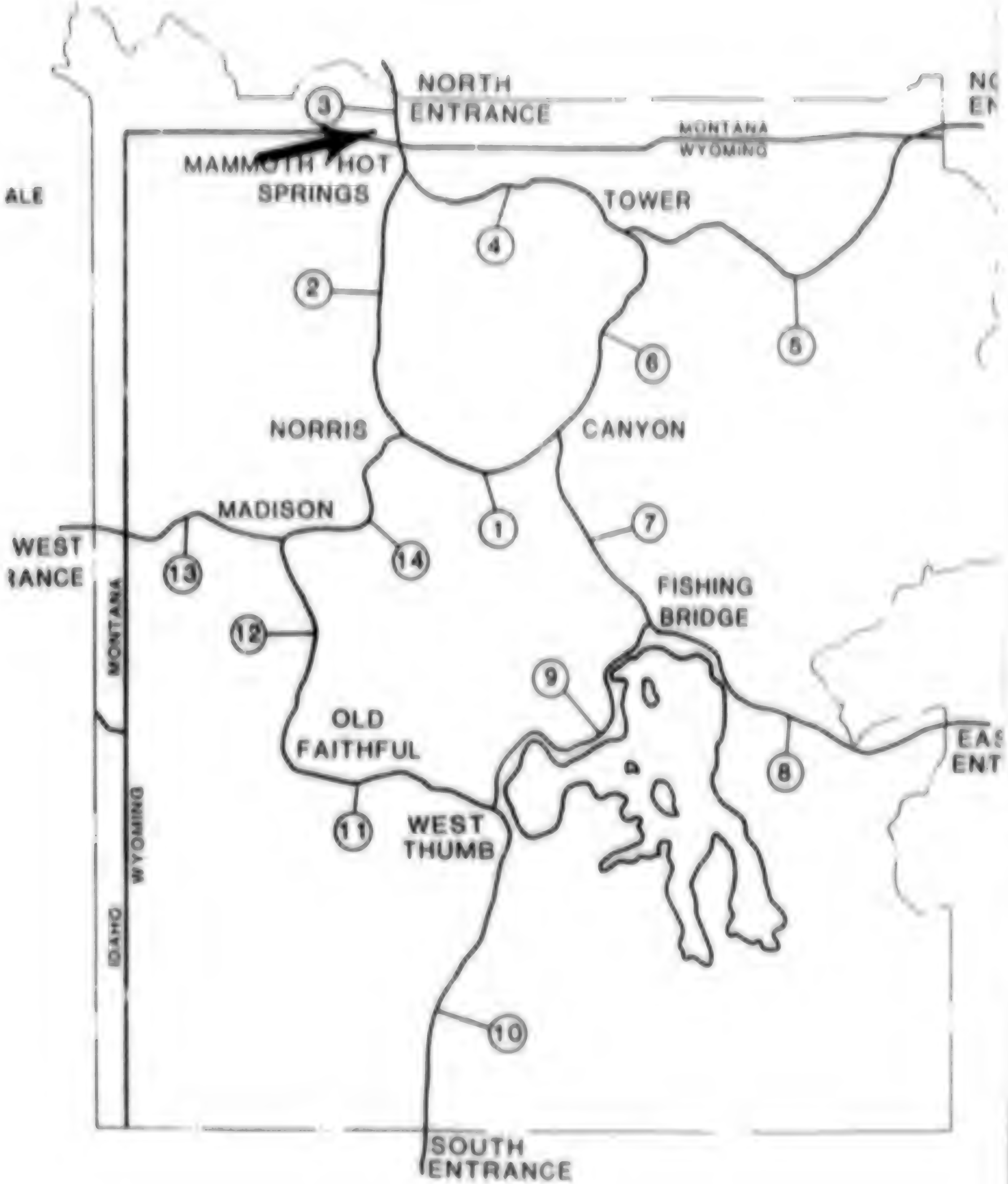
YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND PARKING FACILITIES
ROADWAY SEGMENT NO. 3

MAMMOTH HOT SPRINGS TO NORTH ENTRANCE
(NORTHBOUND)
AUGUST 17, 1992

Note: Blank boxes indicates information not obtained

Mile#	W	E	Feature	Paved	Gravel	Size	Characteristics
0.2	X		Pull Out	X			End Divided Roadway
0.25	X		Pull Out		X		
0.3	X		Pull Out		X		
0.6	X		Access Road				Mammoth Campground
0.6		X	Access Road				Residential Area
0.7	X			X			Mammoth Campground Restrooms
0.8		X	Access Road				Residential Area
0.9	X		Pull Out		X	4	
1.0		X	Trail Head	X		10	
1.1	X		Pull Out		X		
1.3	X		Pull Out		X		
1.4	X	X	Pull Out	X	X		
1.5		X			X		
2.0	X				X		
2.1	X	X	Parking Lot			40	Gardiner River Access
2.1							Montana State Line
2.3	X		Pull Out			1	
2.4	X		Pull Out		X		
2.5	X		Pull Out	X		4	
2.5		X	Pull Out		X		
2.7	X		Pull Out		X		

Mile#	W	E	Feature	Paved	Gravel	Size	Characteristics
2.9	X		Pull Out	X		10	
3.0	X	X	Pull Out	X		4	
3.1		X	Pull Out	X			
3.2	X		Pull Out				
3.3		X	Pull Out		X	7	
3.3	X		Pull Out	X			
3.4	X	X	Pull Out		X		
3.5							Gardiner River Crossing
3.6	X		Pull Out	X			
3.7		X	Pull Out		X		
3.8		X	Pull Out	X			
4.0		X	Pull Out	X		7	
4.2		X	Pull Out	X		10	
4.3		X	Pull Out		X		
4.4		X	Pull Out		X		
4.5			Parking Lot			20	Interpretive Area
4.7		X	Pull Out	X			
4.8			Entrance Station				End of Segment



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YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND PARKING FACILITIES
ROADWAY SEGMENT NO. 4

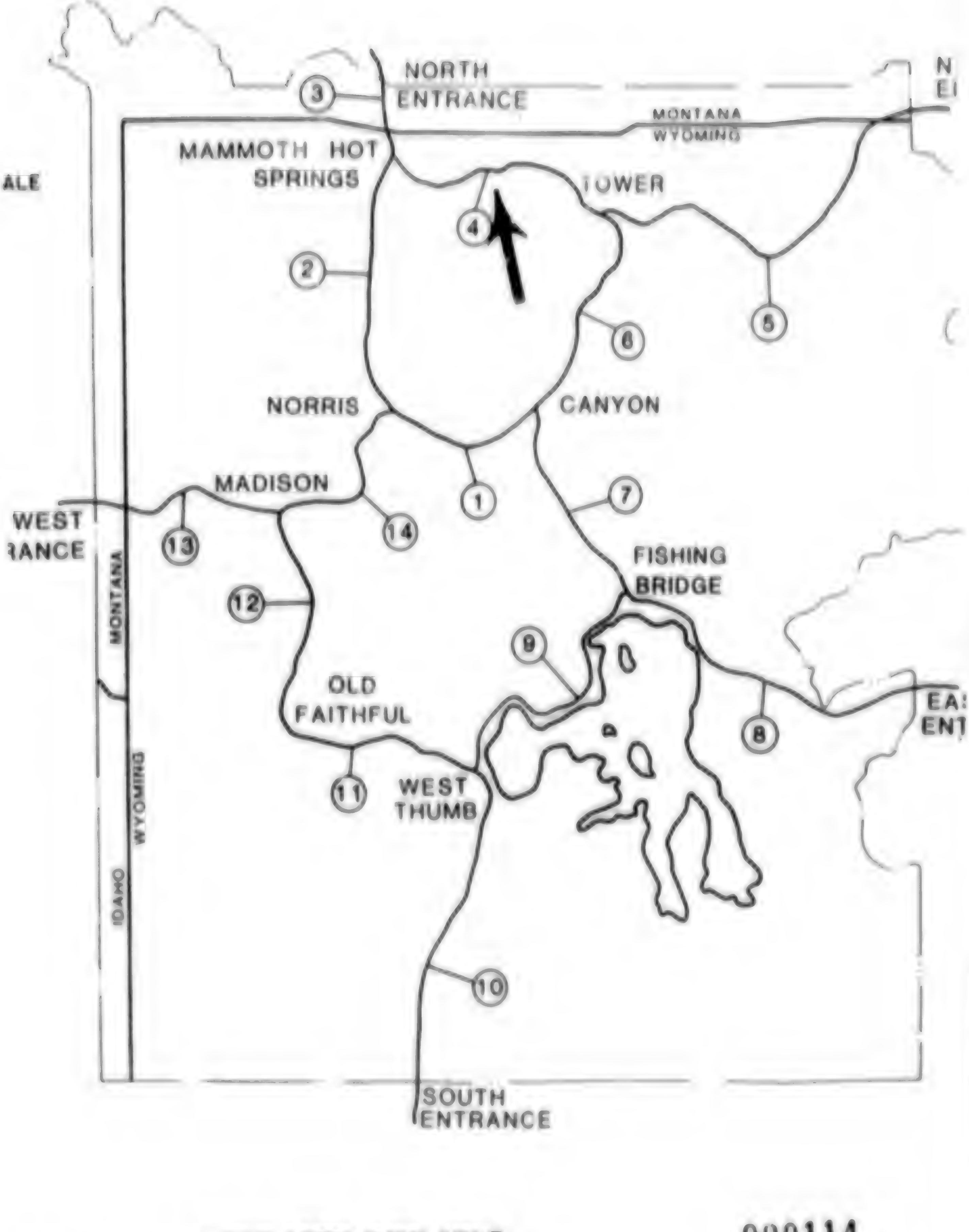
TOWER JUNCTION TO MAMMOTH HOT SPRINGS
(WESTBOUND)
AUGUST 16, 1992

Note: Blank boxes indicates information not obtained

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
1.0							Significant Burned Area
1.2		X	Pull Out	X		5	Interpretive Area
1.4	X		Access Road				To Petrified Tree
1.5	X		Access Road		X		Signed "Do Not Enter"
1.9							Road Signed "Elk Creek"
2.3		X	Pull Out	X		2	
2.4		X	Pull Out	X		2	
3.0	X		Pull Out	X		2	
3.2	X		Pull Out	X		10	Floating Island Lake
3.6		X	Trail Head				Hell Roaring Trail Head
3.6							Road in relatively good shape. No shoulders
4.1	X	X	Pull Out	X		6	
4.5		X	Pull Out	X		2	
5.3		X	Pull Out		X	2	View into Valley
6.0		X	Pull Out	X		5	
6.5		X	Pull Out		X	1	
6.7	X		Pull Out	X		2	
6.h	X		Pull Out	X		3	
7.6	X		Pull Out		X	3	
8.0	X		Pull Out		X	2	Gravel Storage

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
8.7	X		Access Road				Blacktail Plateau—one way road
8.7	X		Pull Out		X	2	
9.2	X		Pull Out	X		15	
9.6		X	Pull Out	X		5	
9.9			Loop Drive	X		20	
10.5	X		Pull Out	X		5	
11.2		X	Pull Out	X		15	
11.6		X	Pull Out			5	Blacktail Deer Creek
12.1		X	Pull Out	X		3	Signed "Blacktail Lakes"
13.4	X		Wraith Falls			15	
13.6	X		Pull Out	X		3	
13.9			Picnic Area			5	Lava Creek Picnic Area
14.0		X	Pull Out		X	1	
14.1	X	X	Noticeable Burned Area				
14.3		X	Undine Falls	X		50	
14.5			Pull Out		X	3	
14.6		X	Pull Out		X	5	
14.7			View of Mammoth Hot Springs from Road				
15.4		X	Pull Out		X	3	
16.3		X	Pull Out		X	3	
16.5	X		Pull Out		X	3	
16.6			Gardiner River Bridge				

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
16.8		X	Pull Out		X	10	
17.1		X	Pull Out		X	1	
17.3	X		Pull Out		X	5	
18.1	X	X	Yellowstone National Park and Chapel				
18.2	X		Mammoth Photo Shop and Parking				
18.5			Road Segment Ends				



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YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND PARKING FACILITIES
ROADWAY SEGMENT NO. 5

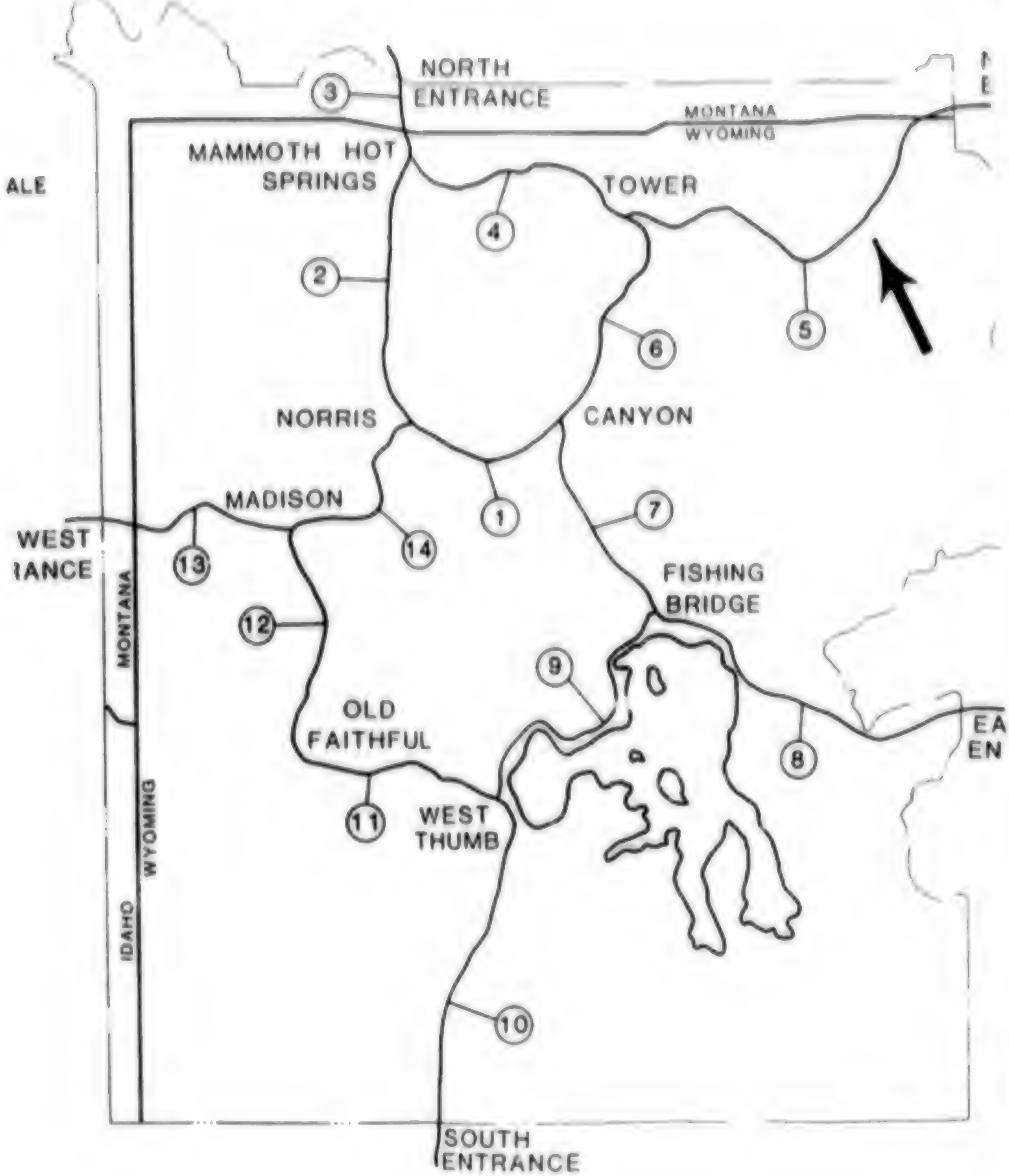
TOWER JUNCTION TO NORTHEAST ENTRANCE
(EASTBOUND)
AUGUST 16, 1992

Note: Blank boxes indicates information not obtained

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
0.6	X		Pull Out	X		4	At Yellowstone River Bridge
1.2		X	Pull Out	X		10	
1.3		X	Pull Out				Picnic Area
2.3		X	Pull Out		X	5	
2.6	X		Pull Out		X	2	
3.1	X		Pull Out		X	3	
3.2	X		Pull Out		X	3	
4.0	X	X	Pull Out		X	6	
4.3		X	Pull Out	X		10	
4.9	X		Pull Out	X		4	
5.1			Trail Head			5	Specimen Trail Head
5.1	X		Pull Out	X		20	Lamar River Bridge
5.5			Pull Out	X		10	Lamar River Bridge
6.0	X		Access Road				Slough Creek Campground
6.7		X	Pull Out		X	4	
7.1		X	Pull Out		X	5	Lamar River Access
7.2		X	Pull Out		X	2	
7.6		X	Pull Out			30	Road is in relatively good shape. Some potholes but good sight lines
8.3							Signed "Lamar Valley"
8.4			Pull Out		X	20	Lamar river Access

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
10.1		X	Pull Out		X	1	
10.5	X		Developed Area Visible				Cabins, etc
10.7	X		Access Road				Lamar Valley Ranger Station and Yellowstone Institute. Signed "No Visitor Services."
12.4		X	Picnic Area			10	Lamar Valley Picnic Area
12.6		X	Pull Out		X	3	Interpretive Area
13.6	X	X	Pull Out		X	7	Soda Butte Creek
14.6		X	Pull Out		X	10	
14.8		X	Pull Out		X	15	Signed "Wildlife Exhibit Ahead"
15.9		X	Pull Out		X	2	For The Soda Butte Viewing Area
17.2	X		Pull Out		X	2	Average Speed on this Roadway is 45-55 mph
17.9							Road Signed "Extreme Caution--Rough Road"
18.1	X		Pull Out			3	
18.3		X	Pull Out		X	3	
18.5		X	Pull Out	X		10	
19.3	X		Access Road				Pebble Creek Campground
19.6	X		Pull Out		X	3	Trail Head
20.3		X	Trail Head			5	
20.6		X					Signed "Ice Box Canyon"
21.5		X	Pull Out		X	15	
22.2		X	Pull Out		X	2	Soda Butte Creek

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
22.8	X		Pull Out		X	5	Creek Access. Road has left the Lamar Valley and is climbing. Average speed is 35–45 mph.
25.7	X		Pull Out	X		5	Soda Butte Creek
26.9		X	Pull Out		X	3	
27.6			Picnic Area			5	Trail Head
28.5							Signed "Approaching Northeast Entrance"
28.7			Entrance Station				End of Roadway Segment
30.7			Silver Gate, Montana				
32.7			Cooke City, Montana				


NORTH ENTRANCE
MONTANA
WYOMING
MAMMOTH HOT SPRINGS
ALE
TOWER
NORRIS
CANYON
MADISON
WEST
RANCE
FISHING BRIDGE
MONTANA
IDAHO
WYOMING
OLD FAITHFUL
WEST THUMB
EA
EN
SOUTH ENTRANCE
1
2
3
4
5
6
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14

YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND PARKING FACILITIES
ROADWAY SEGMENT NO. 6

CANYON TO TOWER JUNCTION
(NORTHBOUND)
AUGUST 16, 1992

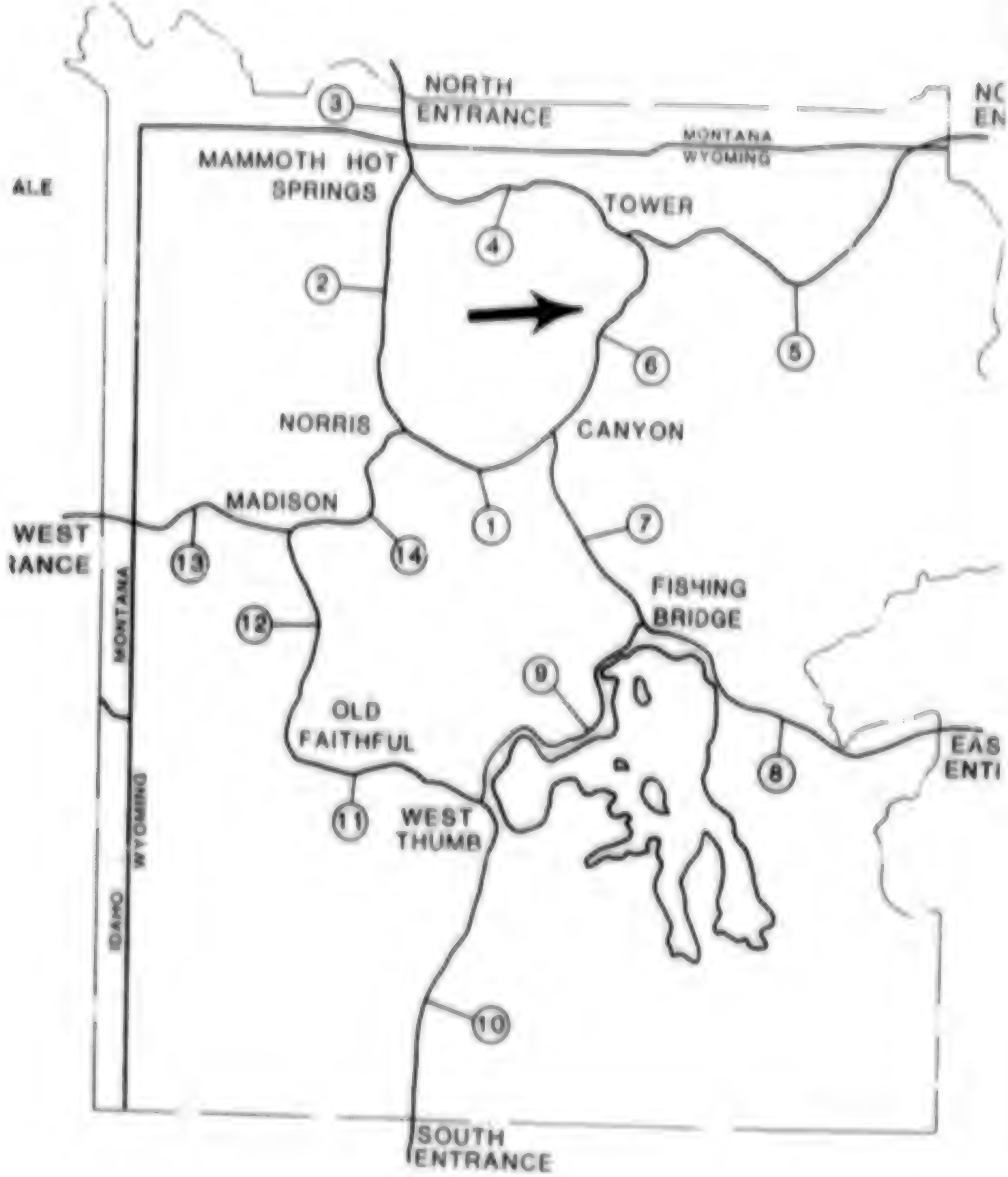
Note: Blank boxes indicates information not obtained

Mile#	W	E	Feature	Paved	Gravel	Size	Characteristics
0.1	X	X	Pull Out		X	10	
0.2		X	Pull Out		X	5	
0.3		X	Access Road				
0.9	X		Pull Out		X	5	
1.1	X		Picnic Area			30	Cascade Lake Picnic Area
1.9		X	Pull Out			2	Road Signed "Rough Road"
2.1		X	Pull Out		X	1	
2.2	X		Picnic Area			20	Dunraven Picnic Area
2.7	X		Service Road				Gated
2.7		X	Pull Out		X	1	
3.2		X	Pull Out	X		3	Interpretive Area
3.6		X	Pull Out		X	1	
4.0		X	Pull Out		X	5	
4.4		X	Pull Out		X	3	
4.5		X	Pull Out		X	1	
4.7			Dunraven Pass				Exhibits and Hiking Area
4.7		X	Pull Out		X	30	Parking Area in poor shape-rutted, standing water. Parking area is on a curve.
4.9		X	Pull Out		X	1	
5.1		X	Pull Out		X	1	View down into valley

Mile#	W	E	Feature	Paved	Gravel	Size	Characteristics
5.9	X		Pull Out		X	2	Road is very narrow and winding, with nice views. Few passing areas.
6.3	X		Pull Out		X	3	
6.4	X		Pull Out		X	4	View down into valley
6.8	X		Pull Out		X	10	
7.0	X		Pull Out		X	2	
7.5	X						Significant views on left side. No guard rails and no pull outs. Road in poor shape.
7.8	X		Pull Out		X	10	
8.0	X						Dense stands of burned lodgepole pines
8.8	X		Pull Out		X	1	
8.9	X		Pull Out		X	3	View down into valley
9.7							Sign for Chittenden Road and Mount Washburn
9.7		X	Access Road				Chittenden Road and Mount Washburn
10.0	X		Pull Out		X	5	
10.1		X	Pull Out		X	3	
10.3		X	Pull Out		X	3	
10.6		X	Pull Out		X	3	View into the Lamar Valley. Road in poor shape.
11.0		X	Pull Out		X	1	
11.3		X	Pull Out		X	3	Interpretive Area
11.6		X	Pull Out		X	2	

Mile#	**W**	**E**	**Feature**	**Paved**	**Gravel**	**Size**	**Characteristics**
11.7		X	Pull Out		X	2	
11.9		X	Pull Out		X	1	
12.1		X	Pull Out		X	5	
12.2		X	Pull Out		X	2	
12.8		X	Pull Out		X	3	
12.9		X	Service Road				Gated
13.6			Access Road				Outlet for one-way access road
13.6		X	Pull Out		X	3	
14.3		X	Pull Out		X	2	
14.6		X	Pull Out		X	2	Signed "Antelope Creek"
15.7	X		Access Road				Gated
15.9			Tower Falls Campground and Store				Developed Area on a curve. Crowded, few warning signs. Pedestrians on roadway. Numerous cars along roadway
16.2		X	Pull Out		X	3	
16.3		X	Pull Out		X	4	
16.4							Road becomes very narrow and hugs a cliff. Significant geologic viewing areas.
16.5		X	Pull Out	X		3	
16.6		X	Pull Out	X		3	
16.7		X	Pull Out	X		3	
16.8		X	Pull Out	X		30	Calcite Springs Overlook
17.3		X	Pull Out	X		2	
17.5		X	Pull Out				Rainy Lake

Mile#	W	E	Feature	Paved	Gravel	Size	Characteristics
18.2	X		Service Road				Access to Roosevelt Horse Corrals
18.4							Roadway segment ends. This roadway is in poor shape. Average speeds are slow. There is virtually no room for bicyclists and few areas for cars to pass.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YELLOWSTONE NATIONAL PARK
RECORD OF ROADWAY FEATURES AND FACILITIES
ROADWAY SEGMENT NO. 7

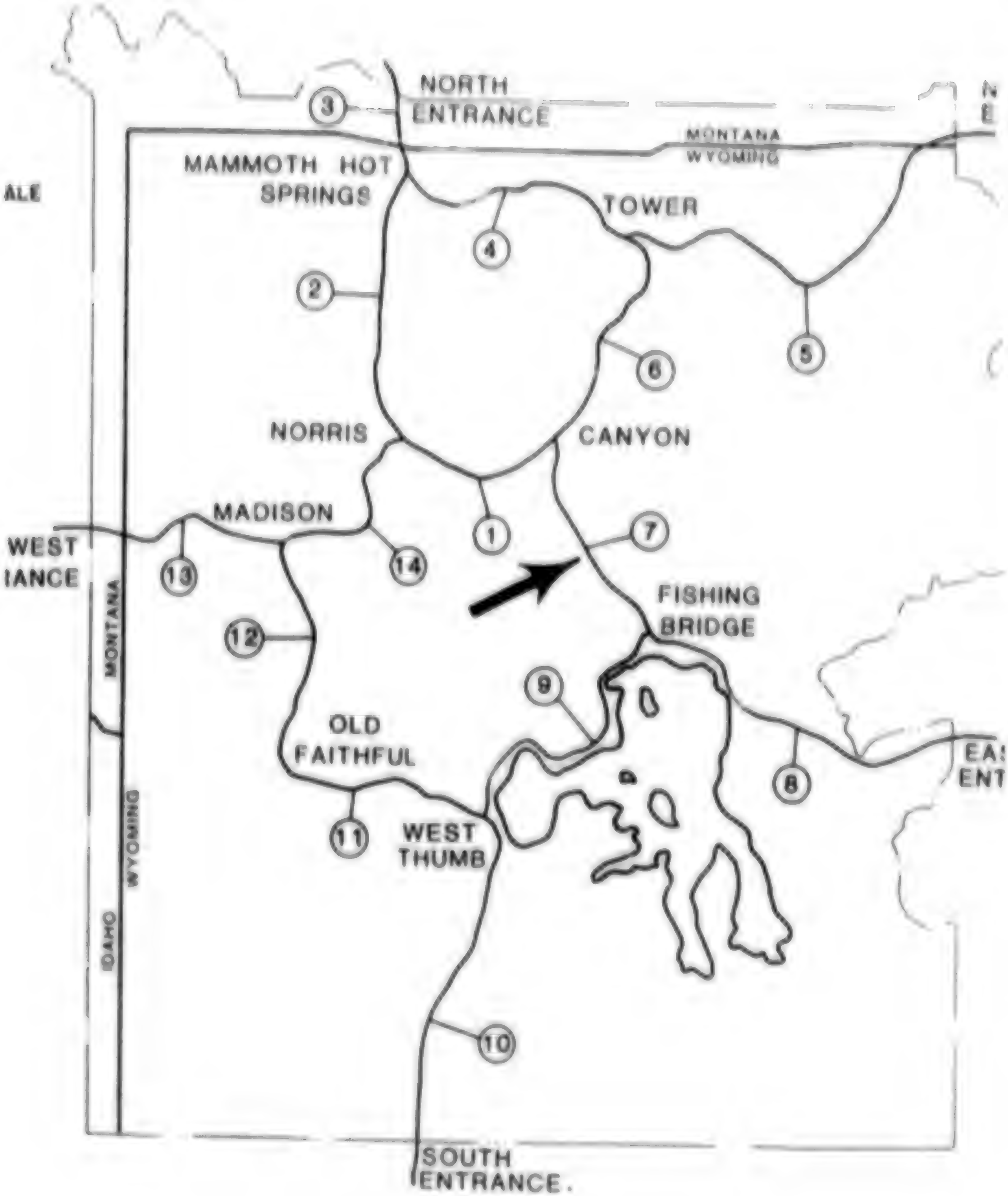
Canyon To Fishing Bridge
(Southbound)
August 13, 1992

Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
0.1		X	Pull Out		X	2	
0.2			Pull Out			10	
0.6	X	X	Pull Out		X	20	
0.7	X		Pull Out		X	2	
0.8	X	X	Pull Out	X	X	15	Canyon Horse Corrals
1.4	X		Pull Out	X		4	
1.5		X	Pull Out	X		15	At Turn For Upper Falls Parking Area
2.0	X	X	Pull Out		X	7	
2.1		X	Trail Head			5	
2.3		X	Pull Out			15	At Turn For Artist Point
2.4	X		Pull Out			10	Yellowstone River Access
2.6	X		Pull Out			2	"Signed Otter Creek"
2.8	X		Pull Out			10	" " "
3.0	X		Pull Out			10	
3.4			Loop Drive			15	
3.5		X	Pull Out			3	
3.8	X		Pull Out	X		2	
4.2	X		Pull Out	X		15	Near North End of Hayden Valley--Frequent Wildlife Traffic Stops

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
4.2							Hayden Valley Closed to Fishing For Next Six Miles
4.5	X	X	Pull Outs			60	Angle Parking
4.6							Signed "Alum Creek"
4.9		X	Pull Out	X		30	
5.1		X	Pull Out		X	2	
5.2		X	Pull Out	X		15	
5.8	X		Pull Out	X		10	Wildlife Exhibit and Yellowstone River View
6.3			Pull Out			20	
6.6			Pull Out			25	
6.8	X		Pull Out			25	
7.3	X		Pull Out			30	
7.5		X	Pull Out			20	Trout Creek
7.5	X		Pull Out			5	Trout Creek
7.8		X	Pull Out			7	
8.0	X		Pull Out			7	Elk Antler Creek
8.6	X		Pull Out			20	Wildlife Exhibit
8.8	X		Pull Out			5	
9.1	X		Pull Out			10	Signed "Geology Exhibit"
9.5	X		Pull Out			2	Approaching Mud Volcano area
9.7	X		Geyser Area				Sulfur Cauldron
9.8	X		Pull Out			2	
10.2	X		Pull Out			10	

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
10.5			Picnic Area				Buffalo Ford Picnic Area
10.6	X		Pull Out			15	
10.7			Picnic Area			10	Cascade Picnic Area
10.9	X		Pull Out			15	Yellowstone River Access
11.2	X		Pull Out			5	
11.4	X		Pull Out			20	
11.4		X	Picnic Area			5	
11.5	X		Pull Out			7	
11.8	X		Pull Out			8	
11.9	X		Pull Out			30	
12.1	X		Pull Out			30	
12.4			Pull Out			20	Signed "LeHardys Rapids"
12.6			Pull Out			20	
12.9	X		Pull Out			15	
13.1	X		Pull Out			25	
13.3	X		Pull Out			10	
13.5	X		Pull Out			10	
13.6	X		Pull Out			10	
14.7	X		Pull Out			5	
15.0	X	X	Pull Out			5	
15.7							End of Segment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YELLOWSTONE NATIONAL PARK
RECORD OF ROADWAY FEATURES AND FACILITIES
ROADWAY SEGMENT NO. 8

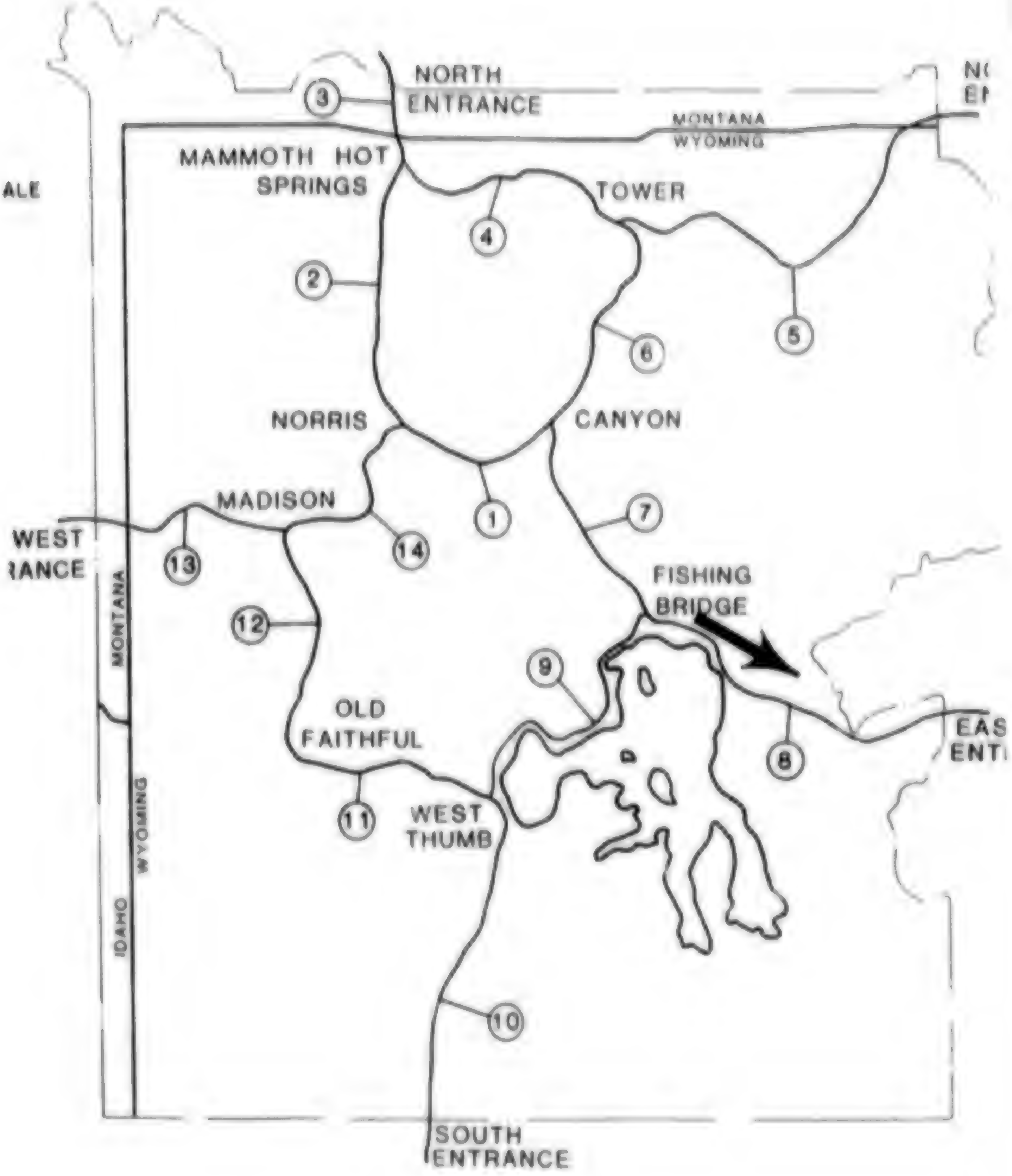
Fishing Bridge RV Park To East Entrance
(Eastbound)
August 14, 1992

Note: Blank boxes indicates information not obtained

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
0.9	X	X	Pull Out			40	Pull Outs on Both Sides of Road
2.2		X	Pull Out	X		10	Lake Access
3.5		X	Pull Out			10	Mary Bay
3.7		X	Pull Out			10	
4.0		X	Pull Out			10	
4.4		X	Pull Out			10	
4.7		X	Pull Out			6	
5.5		X	Pull Out			15	View of Yellowstone Lake
5.6		X	Pull Out			10	View of Yellowstone Lake — Steamboat Point
5.7		X	Pull Out			5	View of Yellowstone Lake
5.7 And on							Road is very narrow and winding
6.3		X	Pull Out			7	
6.6		X	Pull Out			3	Sedge Creek
6.9		X	Pull Out			40	Access to Yellowstone Lake
7.0		X	Pull Out			200	Access to Yellowstone Lake
7.2		X	Pull Out			3	
8.0		X	Pull Out			3	
8.1	X		Trail Head			7	

Mile#	N	S	Feature	Paved	Gravel	Size	Characteristics
9.9		X	Pull Out			20	
11.0		X	Pull Out			10	
11.6		X	Pull Out			5	
11.7		X	Pull Out			3	
13.8		X	Pull Out			5	
14.4	X		Pull Out			3	
15.6		X	Pull Out			5	
15.9		X	Pull Out			2	
16.0		X	Pull Out			1	Sylvan Lake Approach
16.2			Pull Out			20	Sylvan Lake Parking
16.3			Picnic Area			20	Sylvan Lake Picnic Area
16.5			Pull Out			2	
17.3			Pull Out			20	
17.4		X	Pull Out			2	
17.5		X	Pull Out			20	Eleanor Lake Approach
17.8		X	Pull Out			5	
17.9		X	Pull Out			10	
18.1		X	Pull Out			1	
18.3			Sylvan Pass				Gravel Hauling Operation In Progress
18.6							Road Begins a 6% Down Grade
19.4		X	Pull Out			2	
19.9		X	Pull Out			5	
20.2		X	Pull Out			10	Overlook in River Valley
20.4		X	Pull Out			10	

Mile#	**N**	**S**	**Feature**	**Paved**	**Gravel**	**Size**	**Characteristics**
21.7	X		Pull Out			30	
21.7		X	Pull Out			20	
22.8		X	Pull Out			5	
23.0		X	Pull Out			15	
24.2	X		Pull Out			30	
24.3		X	Pull Out			15	
24.6		X	Pull Out			20	
24.8		X	Pull Out			5	
24.9		X	Pull Out			5	
25.3			Pull Out			15	Bathrooms Available
25.4			Entrance Station				End of Road Segment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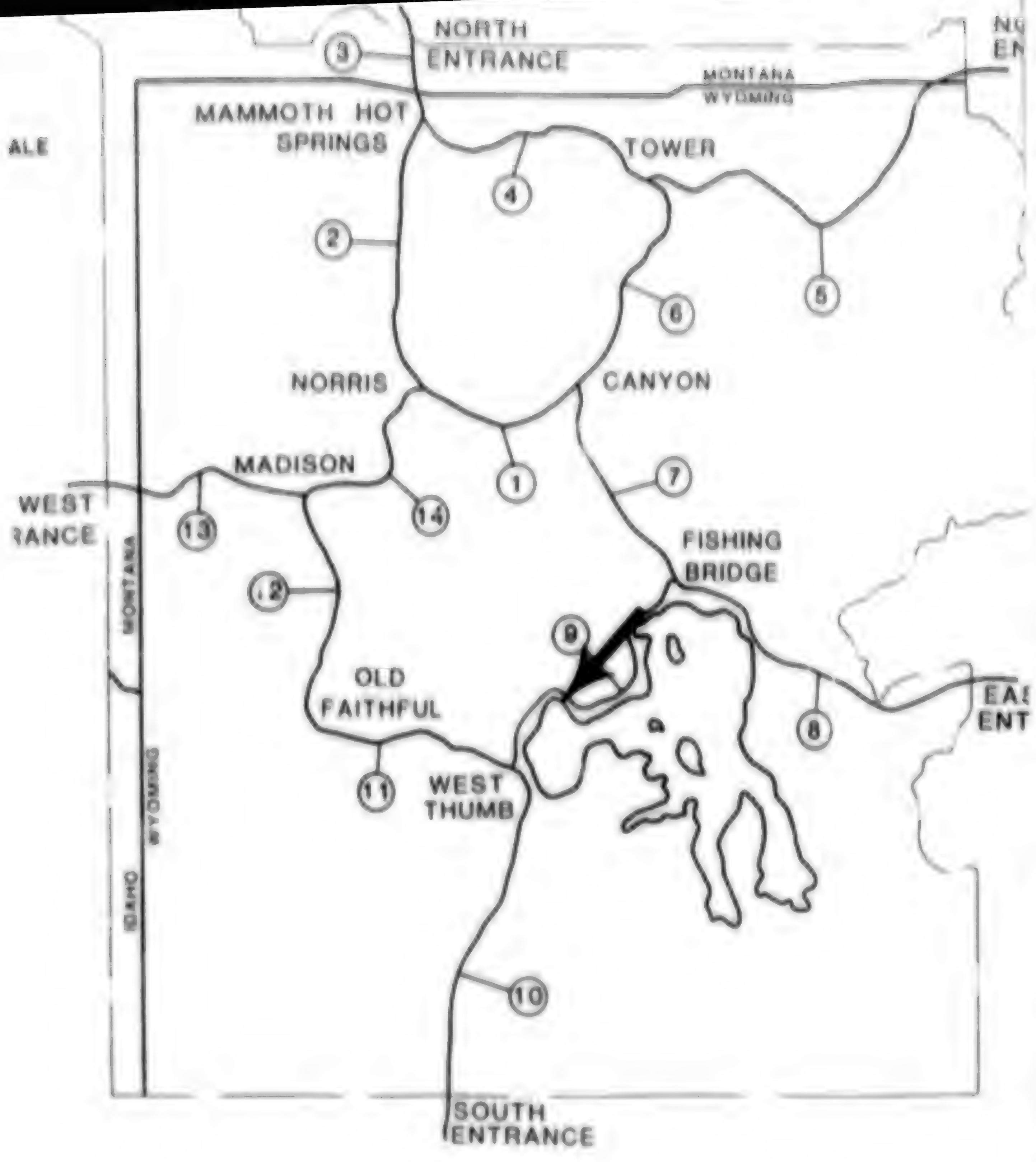
YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND FACILITIES
ROADWAY SEGMENT NO. 9

Fishing Bridge To West Thumb
(Southbound)
August 16, 1992

Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
0.5	X	X	Trail Head			10	Elephant Back Mountain
0.8		X	Pull Out	X		5	
0.9	X		Access Road				To Lake Developed Area
1.4	X		Pull Out			5	
1.5		X	Pull Out			5	
1.8	X		Pull Out			15	Yellowstone Lake View
2.2	X	X	Pull Out			20	
2.6		X	Access Road				To Bridge Bay Developed Area
2.6	X		Pull Out			15	Yellowstone Lake View
3.2	X	X	Pull Out			10	
3.2	X		Access Road				Gull Point Drive
4.1			Pull Out			5	
4.3	X		Pull Out			15	
5.1			Pull Out			10	
5.3	X		Pull Out	X		3	Yellowstone Lake Overlook
5.5	X		Pull Out	X		3	Yellowstone Lake Overlook
6.0			Picnic Area			20	Sand Point Picnic Area
6.5		X	Pull Out	X		5	
7.4		X	Pull Out			15	
8.9	X		Pull Out			10	
9.0	X		Loop Drive			10	
9.1	X		Pull Out	X		30	Yellowstone Lake View

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
9.4			Pull Out	X		20	Signed Exhibit Area
9.9		X	Pull Out	X		15	
11.1	X		Pull Out	X		30	Average Speed 45-55 mph
11.6	X		Loop Drive			5	Yellowstone Lake View
11.7		X	Pull Out			10	
12.0	X		Loop Drive	X		10	
12.8	X		Pull Out	X		40	Yellowstone Lake View and Access
13.2	X		Pull Out	X		20	
13.5	X		Pull Out	X		10	
14.0	X		Pull Out	X		20	
14.6	X		Pull Out	X		7	
15.6	X		Pull Out	X		5	Road Closely Follows the Lake Shore at this point
16.1	X		Pull Out			5	Road in Good Shape. Room for Bicyclists
17.7	X		Pull Out	X		10	Yellowstone Lake Access
17.9	X	X	Pull Out	X		10	
18.1	X		Pull Out	X		4	
18.2	X		Pull Out	X		10	
19.9	X		West Thumb Geyser Basin	X			
20.0							End of Roadway Segment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YELLOWSTONE NATIONAL PARK
RECORD OF ROADWAY FEATURES AND PARKING FACILITIES
ROAD SEGMENT NO. 10

Grant Village to South Entrance
(and Continuation to Moran Junction, Grand Teton National Park)
(Southbound)
August 15, 1992

Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
2.1		X	Pull Out		X		
2.3		X	Pull Out	X			
3.4		X	Pull Out	X			
4.0	X		Pull Out	X			At Continental Divide
4.1			Trail Head	X		15	
4.8		X	Pull Out		X	3	
5.5	X		Pull Out		X	1	
5.5							Noticeable Burned Area
6.6	X		Pull Out		X		
7.0			Trail Head/Entrance Road				
7.3			Trail Head & Road			5	
7.7		X	Pull Out	X			Lewis Lake Access
7.8		X	Pull Out				
8.1		X	Pull Out	X			Lewis Lake Access
8.3		X	Pull Out		X		Lewis Lake Access
8.5			Loop Drive	X			
9.2		X	Pull Out		X		
9.3		X	Loop Drive	X			
9.9		X	Pull Out		X		
10.0		X	Pull Out	X			Signed "Lewis Lake"

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
10.2		X	Lewis Lake Campground Road				
10.7		X	Pull Out	X			
10.9	X		Pull Out		X		
11.2	X	X	Pull Out	X			
11.3	X		Pull Out	X			
11.5		X	Pull Out		X		Lewis Falls Access
11.6			Pull Out	X			
11.8							Noticeable Burned Area
12.3		X	Pull Out	X			Lewis River View and Access
12.6		X	Pull Out	X			Lewis River View and Access
12.7		X	Pull Out	X			Lewis River View and Access
12.8		X	Pull Out	X			Lewis River View and Access
13.1	X		Pull Out	X			
13.3		X	Trail Head				
13.8	X		Pull Out	X			Access to Lewis R.
13.9	X		Pull Out		X		
14.8							Lewis River Canyon
15.0	X		Pull Out	X			Intrepretive Area
15.1	X		Pull Out	X			
16.1	X		Pull Out		X		
16.2	X		Pull Out	X			Canyon View

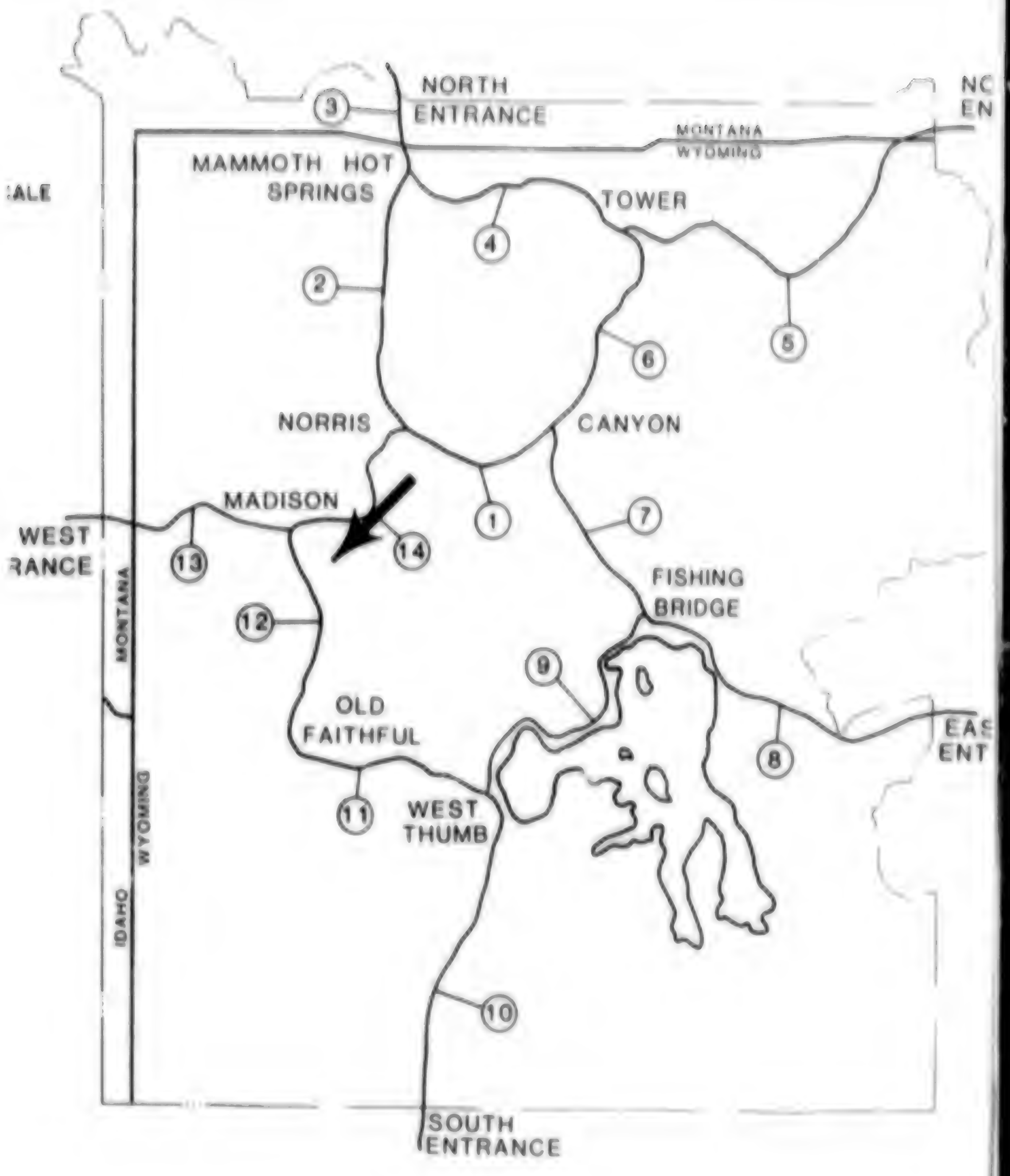
Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
16.6		X	Pull Out		X		
16.8	X		Pull Out	X			
17.6							Teton Mts View Down Roadway
17.9	X	X	Pull Out	X			
19.2	X		Pull Out		X		
20.2	X		Pull Out	X			Moose Falls Access
20.7		X	Pull Out	X			Gated Road at P/O
21.3			Snake River Picnic Area				Plus Snake River Ranger Station
21.5							South Entrance Station
							Begin John D. Rockefeller Pkwy
21.7	X	X	Pull Out	X			
21.8	X	X	Pull Out		X		
22.0	X		Picnic Area				
22.2		X	Pull Out		X		
22.7		X	Pull Out	X			
23.0		X	Pull Out		X		
23.5		X	Grassy Lake Road				To Flagg Ranch Campground
24.0		X	Flagg Ranch Complex				
24.3			Access Road				Teton Natl. Forest

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
24.6	X	X	Pull Out				Access Road, Each Side
24.9		X	Access Road				Gated Road
24.9	X		Pull Out	X			
25.4	X		Pull Out		X		
25.6	X		Access Road				Gated Road
25.7		X	Pull Out	X			
26.0		X	Pull Out	X			
26.4		X	Pull Out	X			
26.6		X	Pull Out	X			
27.1	X		Pull Out	X			
27.3		X	Pull Out	X			
27.5		X	Pull Out	X			
27.6	X		Pull Out	X			Interpretive Area
28.3	X		Pull Out	X			Interpretive Area
28.4		X	Pull Out	X			Interpretive Area
							Entrance to Grand Teton Natl. Park
29.2	X		Pull Out		X		
29.5		X	Pull Out		X		
29.9	X		Pull Out		X		
30.3	X		Pull Out		X		
30.4	X		Loop Drive		X		

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
30.7	X		Pull Out		X		
31.3		X	Campground Access				Lizard Creek
32.0		X	Pull Out	X			Partial Tetons View
32.1		X	Pull Out		X		
32.5			Loop Drive Begin				
32.6			Loop Drive End				
33.1		X	Pull Out	X			Lake View
33.3		X	Pull Out	X			Lake View
33.5		X	Pull Out	X			Lake View
34.0		X	picnic area				
34.1		X	Pull Out	X			
34.3	X		Pull Out	X			
34.5	X		Access Road				Unmarked
35.0	X		Picnic Area				Loop Drive
36.4		X	Pull Out	X			
37.4		X	Picnic Area				Loop Drive
37.4	X		Picnic Area				Loop Drive
37.5	X		Pull Out	X			
38.5		X	Access Road	X			Leeks Marina
38.7	X		Pull Out	X			
39.4		X	Access Road				Colter Bay Village
39.8		X	Pull Out		X		
40.0	X		Pull Out	X			

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
40.1			Access Road				Unsigned
40.2	X		Pull Out		X		
41.2	X		Loop Drive				
41.2	X		Access Road				Pilgrim Creek Road, Teton National Forest
41.5	X		Pull Out		X		
42.2	X		Loop Drive		X		
42.9			Access Road		X		Unsigned
43.1		X	Pull Out		X		
43.3	X		Pull Out		X		
43.8		X	Access Road				Jackson Lake Lodge
44.3		X	Overlook				Willow Flats
44.3	X		Access Road				Private Road
44.7		X	Pull Out	X			
44.9			Road Junction				Jackson Lake Junction
45.4		X	Pull Out		X		
45.5		X	Access Road				
46.0		X	Pull Out		X		
46.1		X	Pull Out	X			Oxbow Bend
46.5		X	Pull Out	X			
46.7	X		Pull Out		X		
47.1		X	Pull Out		X		
47.4		X	Pull Out		X		
47.7	X		Access Road				Pacific Creek Road

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
12.9	X		Pull Out			10	
13.0		X	Pull Out			2	
13.1	X		Pull Out			1	
13.5	X	X	Trail Head			10	
13.7							End of Segment--This Roadway is Notable for Poor Road Condition, Few Passing Lanes and Slow Average Speeds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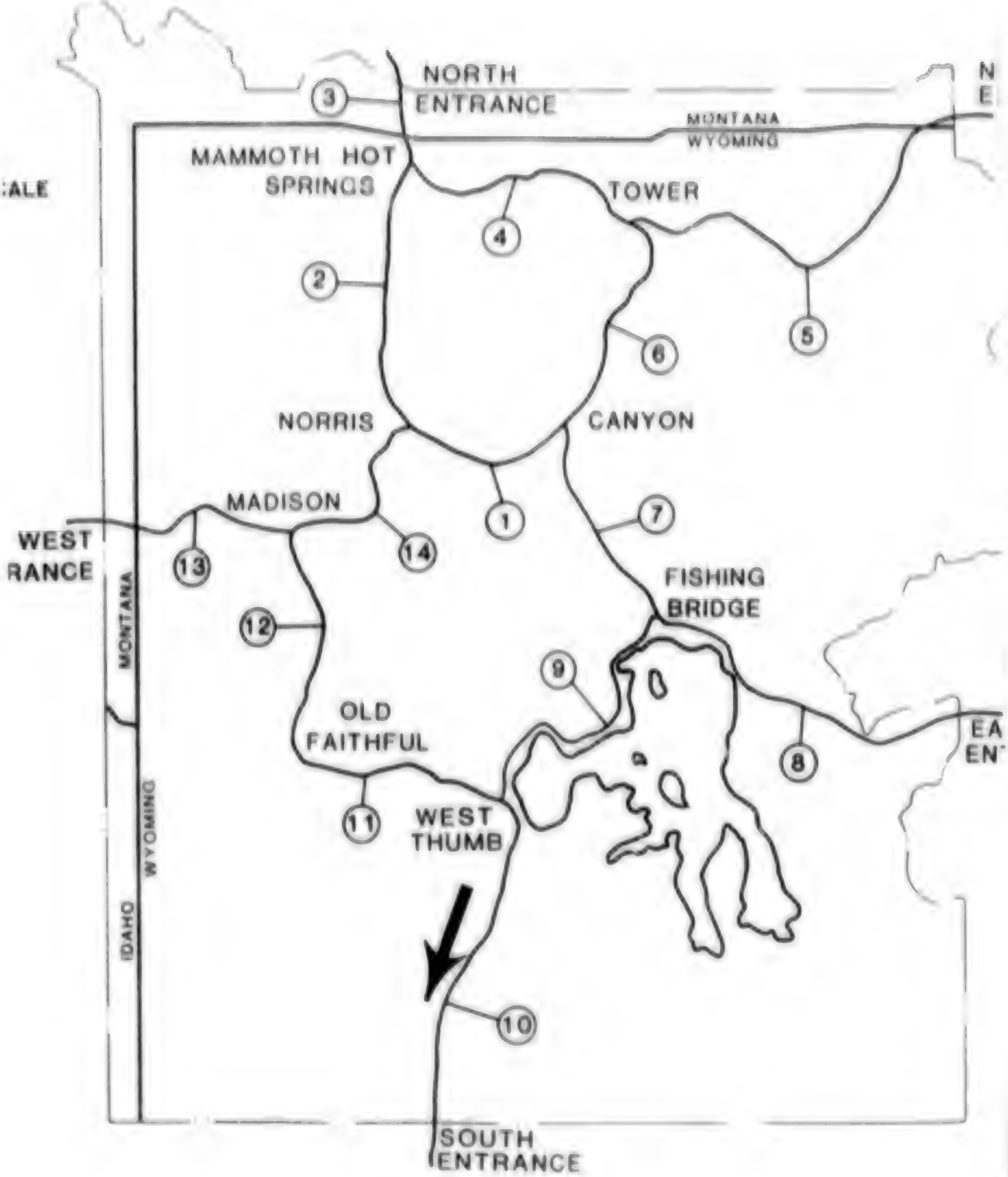
Mile#	**E**	**W**	**Feature**	**Paved**	**Gravel**	**Size**	**Characteristics**
48.4		X	Access Road	X			Snake River Access
48.7			Access road				Private Road
48.8							Entrance Station, Grand Teton National Park
48.9			Road Segment Ends				Moran Junction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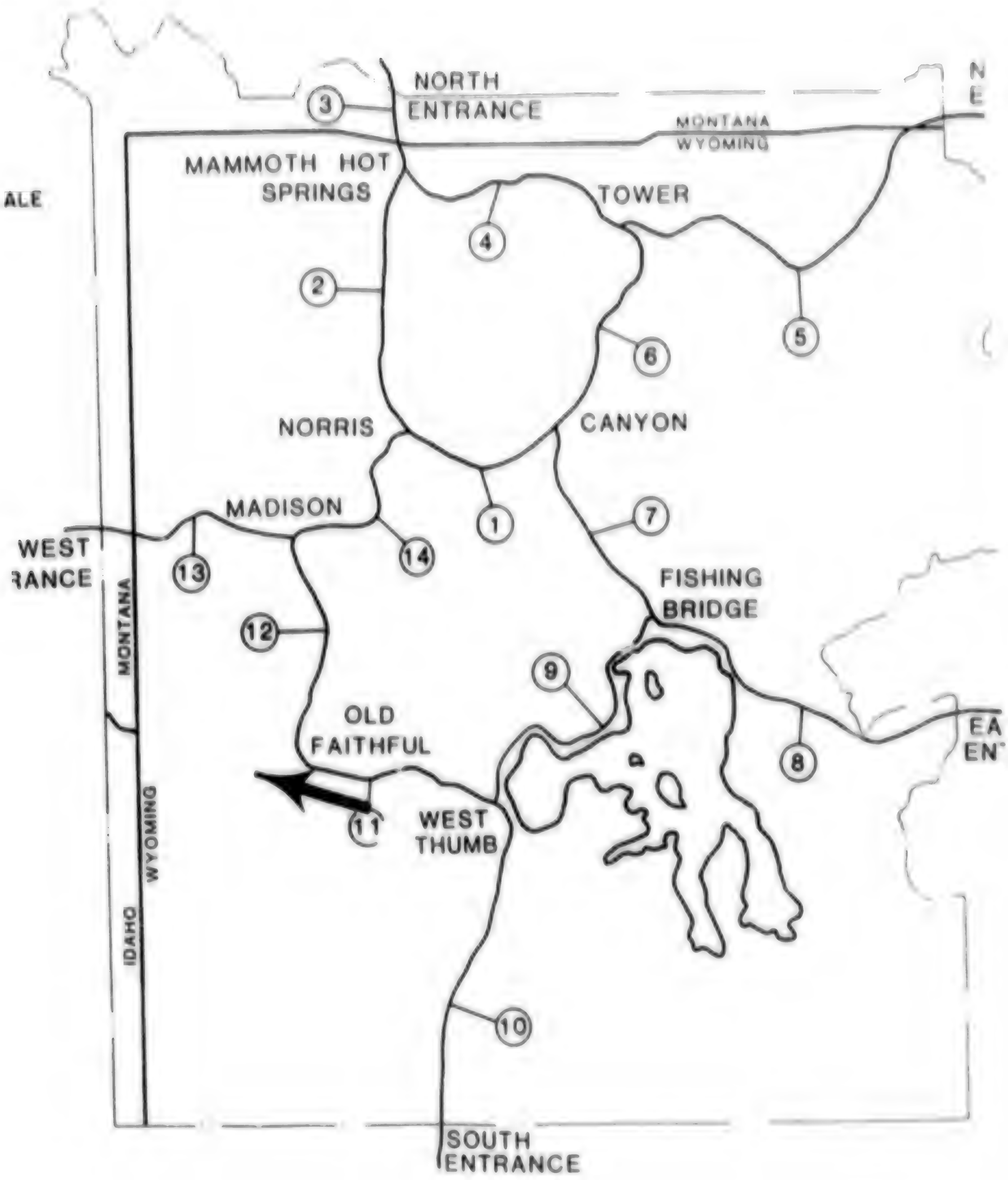
YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND PARKING FACILITIES
ROADWAY SEGMENT NO. 11

West Thumb Geyser Basin To Old Faithful
(Westbound)
August 16, 1992

Note: Blank boxes indicates information not obtained

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
0.1		X	Pull Out	X		5	
0.2		X	Pull Out	X		15	
0.4		X	Pull Out		X	3	
0.6		X	Pull Out		X	10	
2.0							Road in Preparation for Paving
3.1	X	X	Pull Out	X		20	In use for Gravel Storage and Road Machinery Parking
3.7		X	Picnic Area			5	Divide Picnic Area
4.2		X	Pull Out			5	Signed "Continental Divide"--In use for Gravel Storage
5.4	X	x	Pull Out		X	10	Gravel Storage
7.5		X	Pull Out	X		3	
8.1		X	Pull Out	X		5	
8.2	X		Pull Out	X		3	Shoshone Point Approach
8.3	X		Pull Out	X		10	Shoshone Point Viewing Area
8.7		X	Loop Drive				
8.8		X	Pull Out	X		5	
9.1	X		Pull Out	X		5	
9.6	X		Pull Out	X		3	
10.0	X		Pull Out	X		5	Signed "Continental Divide"
10.1	X		Pull Out	X		10	
10.9	X		Pull Out	X		5	

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
11.1	X		Pull Out		X	5	Gravel Storage
11.8		X	Pull Out		X	2	
12.1	X		Picnic Area			5	Spring Creek Picnic Area
12.5	X		Pull Out	X		5	
12.8		X	Pull Out			5	Gravel Storage
13.7		X	Pull Out	X		7	
13.8	X		Pull Out		X	2	
14.0	X	X	Pull Out	X		10	
14.2	X		Pull Out	X		5	
15.2	X		Pull Out	X		30	Signed "Kepler Cascades and Lone Star Geyser"
15.6	X		Pull Out	X		5	
17.1		X	Pull Out	X		5	
17.6	X		Pull Out	X		10	
17.8			Turn Out For Old Faithful				End of Road Segment


NORTH ENTRANCE
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YELLOWSTONE NATIONAL PARK
RECORD OF ROADWAY FEATURES AND FACILITIES
ROAD SEGMENT NO. 12

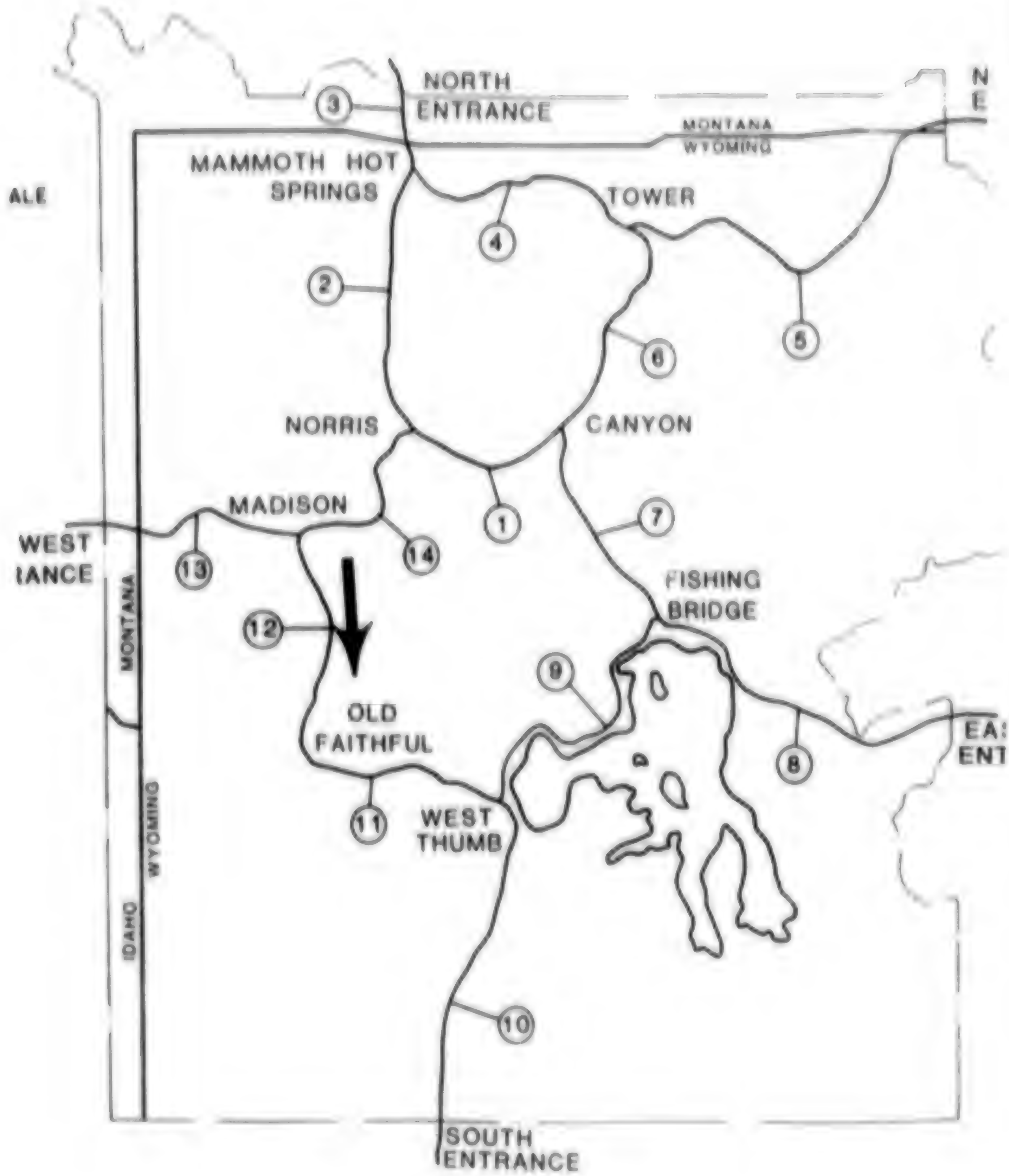
Madison Junction To Old Faithful
(Southbound)
August 17, 1992

Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
0.1		X	Madison Museum				
0.4			Gibbon River Bridge				
0.5		X	Firehole Canyon Drive				One-Way Road
0.8		X	Pull Out		X	1	
0.9		X	Service Road				
1.0		X	Loop Drive	X		5	
1.4		X	Pull Out	X		5	
1.5			Significant Burned Area				
1.6	X		Pull Out		X	3	
1.8		X	Loop Drive		X	5	
2.3	X		Service Road				
2.4		X	Firehole Canyon Drive				One-Way Road;Entry Two Miles Previous
2.4		X	Pull Out	X		6	
2.6	X	X	Pull Out		X	4	Access to Firehole River
3.1	X		Pull Out		X	3	Positioned on a Curve
3.8		X	Pull Out		X	2	Access to Firehole River
4.1		X	Pull Out		X	1	
4.2		X	Pull Out			5	
4.3			Service Road				Gated
4.4			Loop Drive			20	
4.6			Picnic Area			20	
4.9		X	Pull Out		X	20	
5.0		X	Loop Drive			30	

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
5.2	X	X	Pull Out		X		Numerous Parking Areas Along Road and Near River--Road In Poor Shape.
5.7			Fountain Flat Drive				Access to Fountain Paint Pots
5.8		X	Pull Out		X		Numerous Parking Areas Along Road
6.1			Pull Out			5	Signed "Chief Joseph Story"
6.3	X	X	Pull Out				Numerous Parking Areas Along Road. Access to Nez Perce Creek.
6.6	X		Trail Head			5	
7.5	X		Lower Geyser Basin		X	5	Visible From Several Hundred Feet Away. No Formal Parking Area; Roadside Parking Only.
7.8		X	Pull Out			10	Signed "Access to Geyser Area, 1/3 Mile"
8.0		X	Fountain Paint Pots				Large Lot and Difficult Exit (on a Curve)
9.0	X	X	Pull Out				Numerous Parking Areas Along Road.
9.3	X		Firehole Lake Drive				Thermal Areas Visible From Main Road
9.4		X	Pull Out		X	2	
9.8	X		Picnic Area				
10.3		X	Midway Geyser Basin	X		50	
10.9	X		Pull Out	X		5	
11.0		X	Pull Out		X	5	Thermal Areas Visible
11.2		X	Loop Drive			5	
11.4		X	Pull Out		X	10	View of Firehole River and Thermal Area

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
11.5		X	Pull Out		X	10	
11.8		X	Pull Out		X	1	
11.9		X	Pull Out		X	1	
12.0		X	Access Road				
12.2			Pull Out		X	10	
12.9		X	Pull Out		X	10	
13.0		X	Pull Out		X	10	
13.8		X	Pull Out		X	3	
14.0	X		Pull Out		X	10	
14.4			Speed Limit Reduced To 35 mph				
14.5		X	Biscuit Basin	X			
14.6			Firehole River Bridge				Road in Relatively Good Shape Room for Bicyclists
14.8	X		Pull Out	X			
15.6	X	X	Pull Out	X		10	
15.8		X	Pull Out	X		5	
16.1		X	Black Sand Basin	X			
16.3		X	Turnoff For Old Faithful Area and Clinic				
16.6			End of Road Segment				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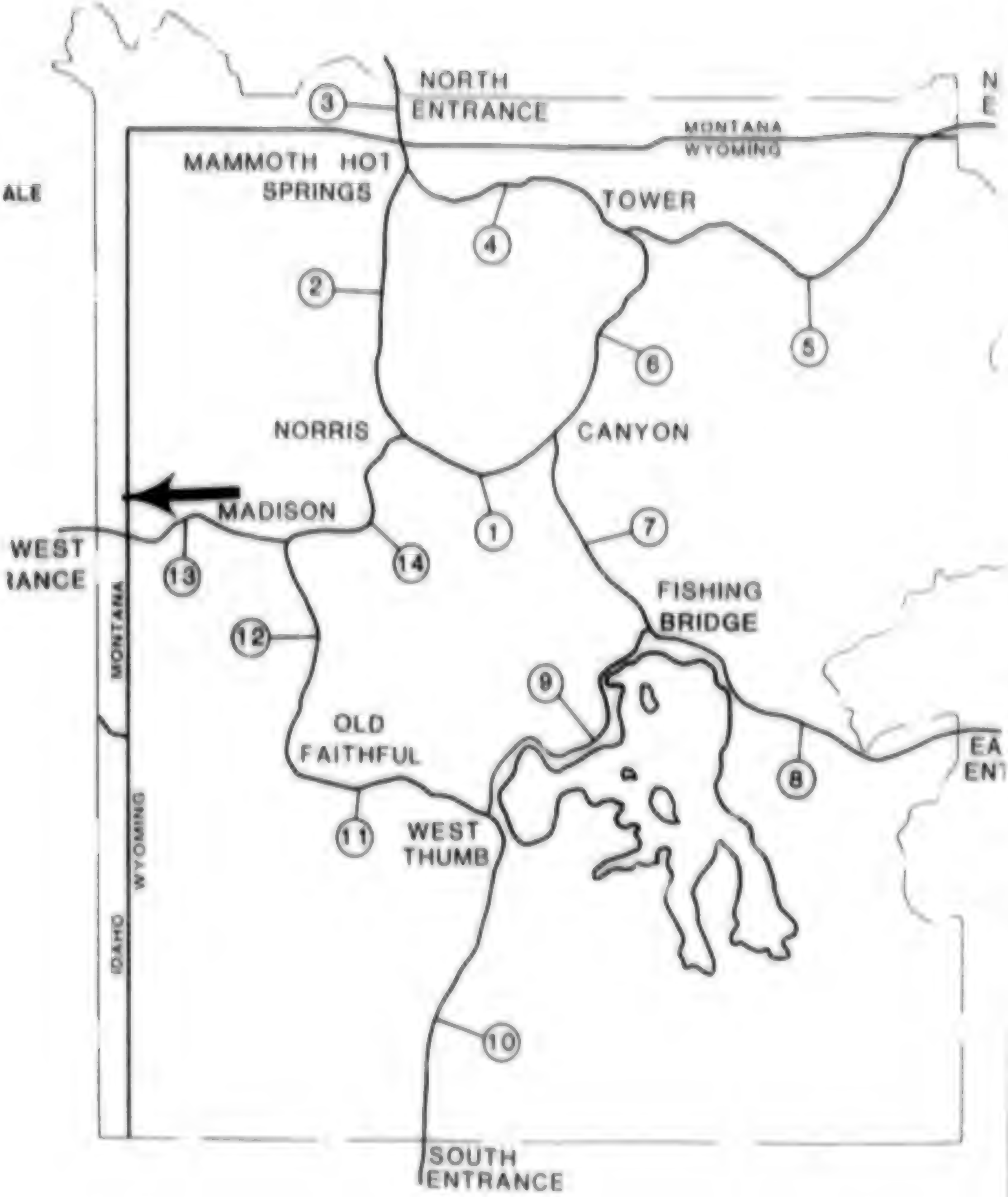
YELLOWSTONE NATIONAL PARK
ROADWAY FEATURES AND FACILITIES
ROADWAY SEGMENT NO. 13

Madison Junction To West Entrance
(Westbound)
August 12, 1992

Note: Blank boxes indicates information not obtained

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
0.2		X	Pull Out			1	
0.4		X	Pull Out			1	
1.0	X		Pull Out			5	Signed "Wildlife Exhibit Ahead"
1.3		X	Pull Out			1	
1.3	X		Pull Out			20	Exhibit
1.9		X	Pull Out			1	
2.0	X		Loop Drive			5	Wildlife Viewing
2.7	X		Pull Out			10	Madison River Access
2.9		X	Pull Out			1	
3.0		X	Loop Drive			3	
3.2		X	Pull Out			1	
3.2	X		Loop Drive			15	
3.8			Pull Out			1	
4.2	X		Pull Out			1	
4.3	X		Pull Out			15	
4.9		X	Loop Drive			5	
6.0	X		Pull Out			20	
6.4			Picnic Area			20	Madison River Picnic Area
6.5			Pull Out			10	
6.9		X	Pull Out			15	
7.0		X	Pull Out			3	

Mile#	S	N	Feature	Paved	Gravel	Size	Characteristics
7.3		X				5	
8.0		X	Access Road			5	Riverside Drive–One Way, Approx. One-half Mile. No Major Parking Areas
8.3		X	Pull Out			30	
8.9		X	Pull Out			2	
9.7		X	Loop Drive			7	
10.7		X	Loop Drive			50	
10.9		X	Loop Drive			30	Boardwalk Near River
11.7		X	Loop Drive			30	Montana State Line
12.3		X	Pull Out				Madison River Access
13.2		X	Pull Out				
13.5		X	Pull Out			5	
13.7			Entrance Station				End of Segment--No Parking Areas at the Entrance Station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YELLOWSTONE NATIONAL PARK
RECORD OF ROAD SEGMENT FACILITIES AND FEATURES
SEGMENT NO. 14

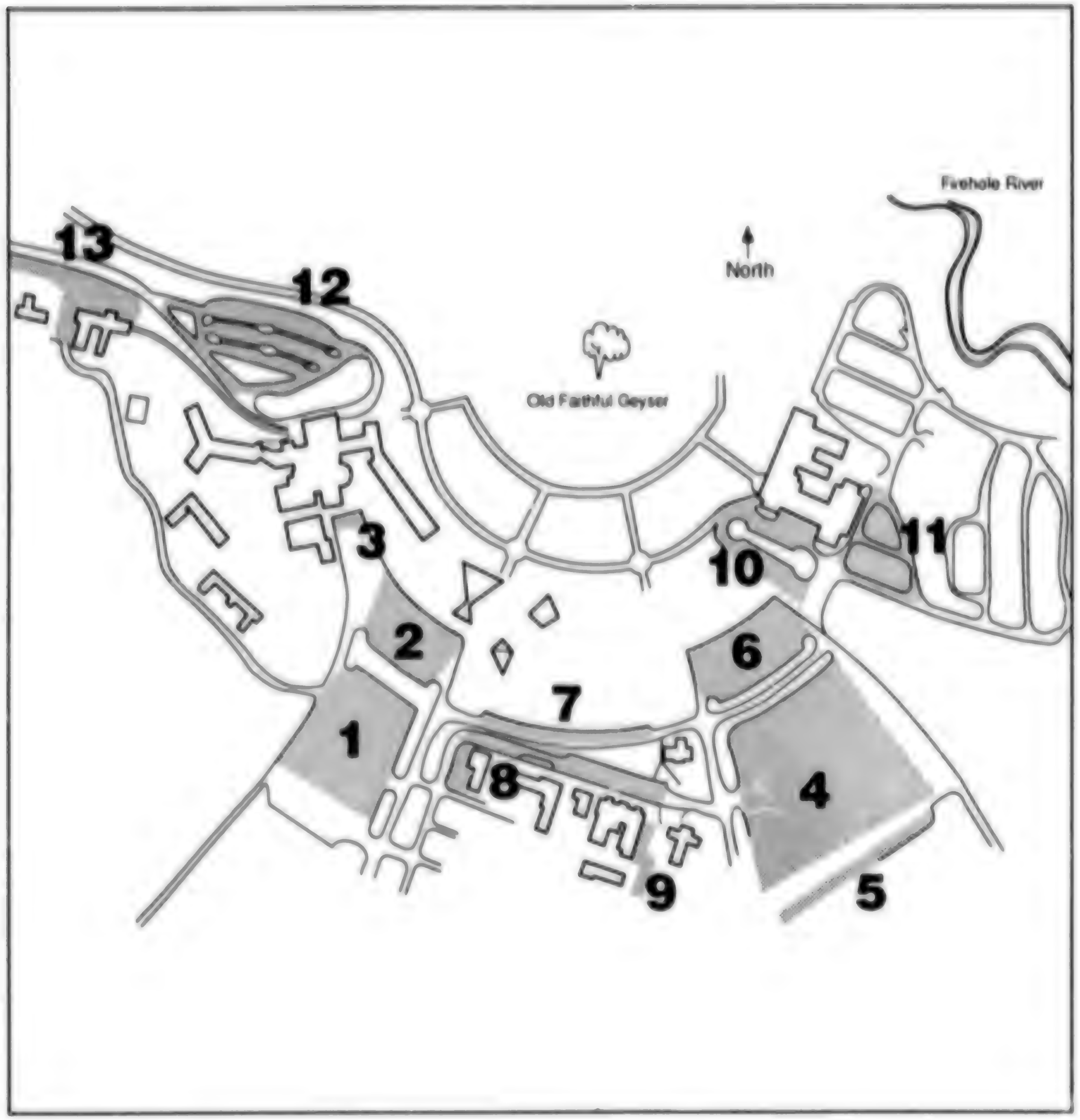
Norris Geyser Basin To Madison Junction
(Southbound)
August 12 and August 16, 1992

Note: Blank boxes indicates information not obtained

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
To 1.5							Roadway is Wider Than Other Segments. With Greater Capacity for Bicyclists and Pedestrians
1.7		X	Pull Out			20	Elk Park
2.0		X	Pull Out			15	Elk Park
2.6		X	Pull Out			50	
2.8		X	Pull Out			20	
3.0			Picnic Area			10?	Gibbon Meadows
3.3	X		Pull Out			7	
3.5		X	Pull Out			30	
3.7		X	Pull Out			20	
3.9	X	X	Artists Paint Pots			20	Half-mile Walk to Thermal Area
4.2		X	Pull Out			7	
4.4			Loop Drive			5	
4.8		X	Pull Out			5	
4.9			Pull Out			3	
5.1			Beryl Spring			30	Roadside Thermal Area
5.3			Loop Drive			4	
6.0		X	Pull Out			8	
6.1		X	Pull Out			4	
6.2		X	Pull Out			2	
6.3		X	Pull Out			1	

Mile#	E	W	Feature	Paved	Gravel	Size	Characteristics
6.4		X	Pull Out			1	
6.7		X	Pull Out			5	Phone Services
6.8		X	Pull Out			1	
7.3	X		Pull Out			3	
7.6	X		Pull Out			3	
7.7	X		Pull Out			7	
7.8	X		Pull Out			12	
8.2	X		Pull Out			12	
8.3	X		Pull Out			15	
8.5	X		Gibbon Falls			50	Popular Attraction
9.0			Picnic Area			16	Gibbon Falls
9.0	X		Pull Out			40	
9.4	X		Pull Out			15	
9.6	X		Pull Out			2	
9.7		X	Pull Out			3	
10.2	X		Pull Out			5	
10.5	X		Pull Out			15	
11.0	X		Pull Out			2	
11.5	X		Pull Out			2	
11.8	X		Pull Out			2	
11.9	X		Loop Drive			10	
12.1		X	Picnic Area			10	Tuff Cliffs
12.2	X		Pull Out			10	
12.6	X		Pull Out			10	

APPENDIX B: Parking Areas of Yellowstone National Park



OLD FAITHFUL

LEGEND

1	OF-1 WEST LOT 180 striped
2	OF-2 VISITOR CENTER 104 striped
3	OF-3 INN-REAR 7 striped (incl 3 handicap)
4	OF-4 EAST LOT 487 striped back four rows designated RV parking
5	OF-5 SOUTHEAST LOT 45 capacity head-in striped
6	OF-6 NORTHEAST LOT 102 striped
7	OF-7 SNOWLODGE NORTH 36 striped
8	OF-8 SNOWLODGE FRONT/WEST 70 striped
9	OF-9 HAMILTON STORE-SNOWLODGE 21 gravel
10	OF-10 LODGE WEST 80 unstriped (incl 1 handicap)
11	OF-11 LODGE REAR 80 gravel
12	OF-12 INN MAIN 175 striped/unstriped (incl 14 parallel to curb for bus & RV parking)
13	OF-13 HAMILTON-STORE INN 50 striped

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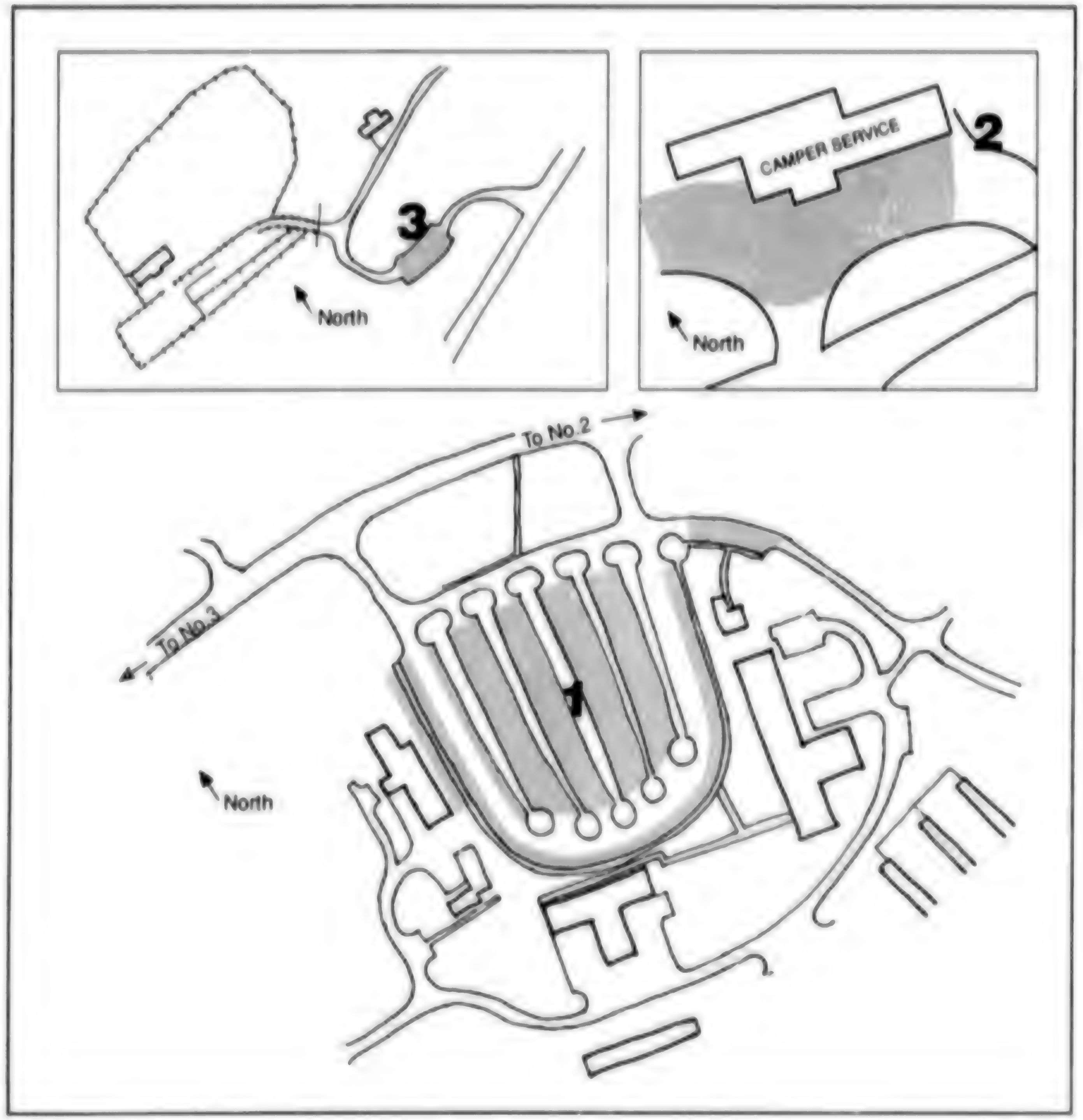
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



CANYON VILLAGE

LEGEND

1	CV-1 CANYON VILLAGE 447 spaces
2	CV-2 CAMPER SERVICES 55 spaces
3	CV-3 CANYON HORSE CORRAL 55 spaces

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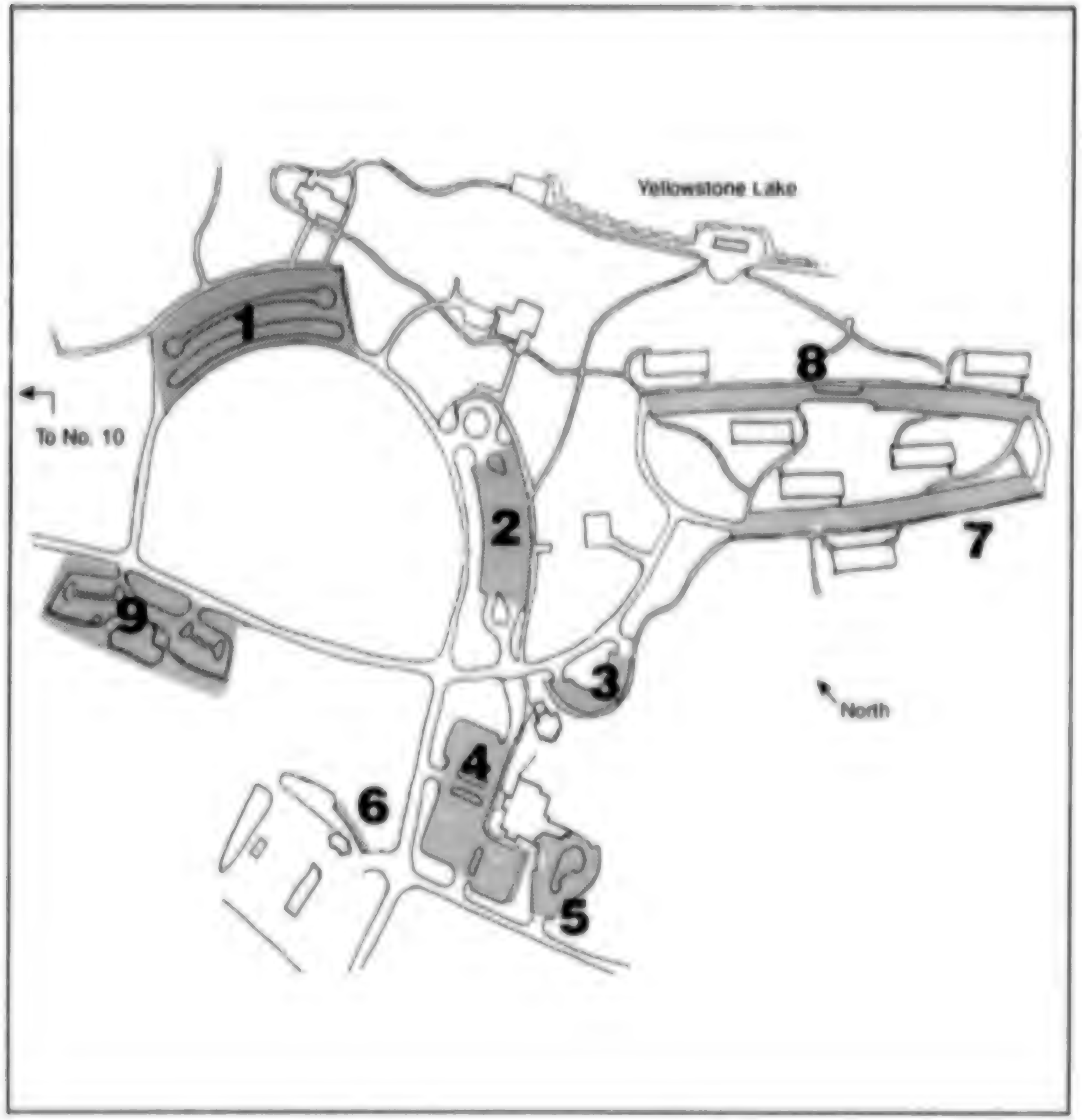
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



GRANT VILLAGE

LEGEND

1	GV-1 VISITOR CENTER 57 striped, 80 unstriped (incl. 2 handicap)
2	GV-2 POST OFFICE 115 striped, (incl. 2 handicap)
3	GV-3 GUEST REGISTRATION 46 striped, incl. 2 spaces for bus/RV (incl. 3 handicap)
4	GV-4 HAMILTON STORE MAIN LOT 114 striped, incl. 6 bus/RV (incl. 4 handicap)
5	GV-5 HAMILTON STORE REAR LOT 36 striped
6	GV-6 HAMILTON MINI STORE 12 gravel
7	GV-7 LODGE GUEST PKG. SOUTH 132 striped, incl. 6 bus, (incl. 5 handicap)
8	GV-8 LODGE GUEST PKG. NORTH 113 striped, incl. 6 bus, (inc. 14 handicap)
9	GV-9 CAMPER SERVICES 70 unstriped
10	GV-10 6 long RV S at campground entrance

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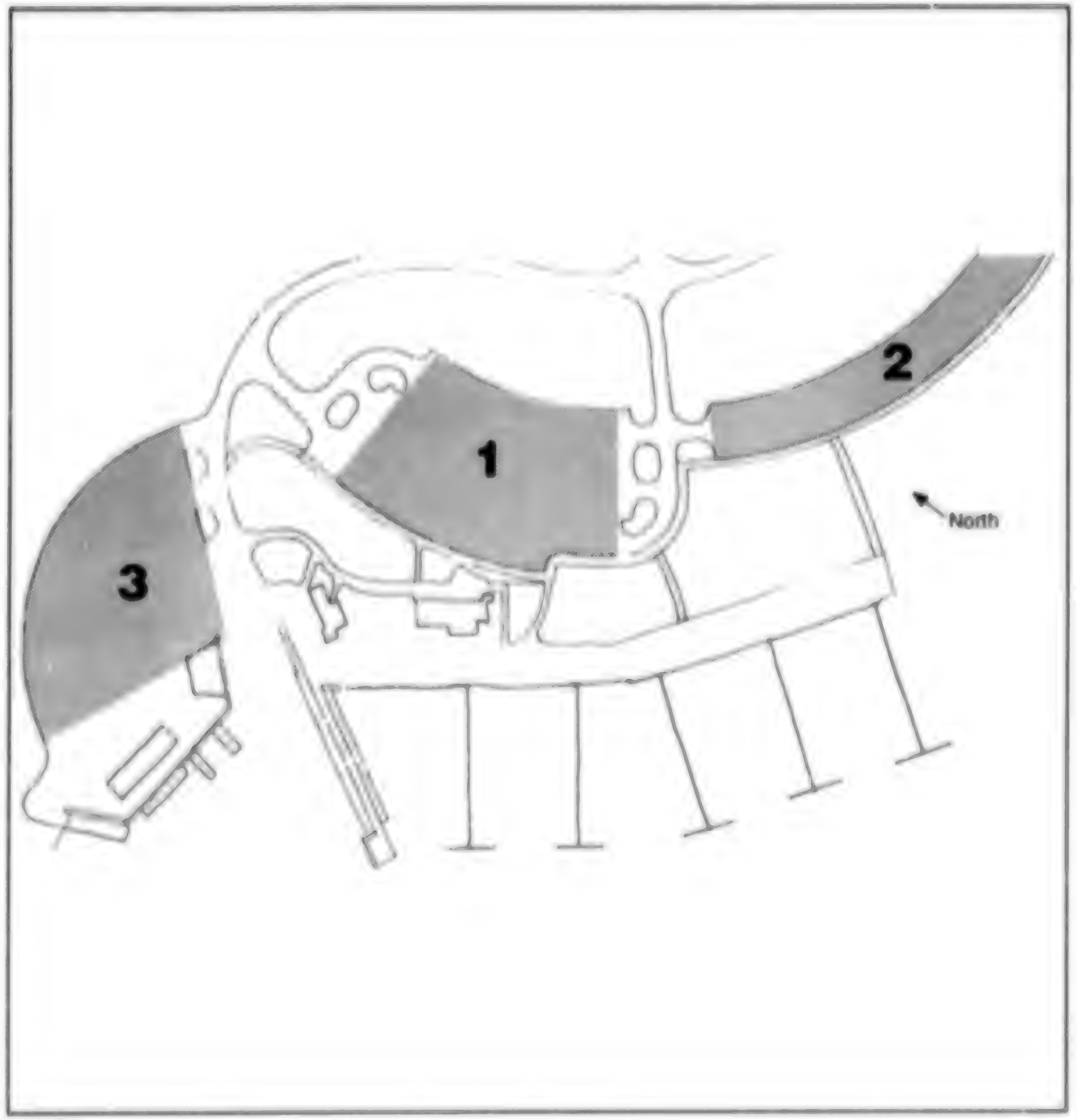
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



BRIDGE BAY

LEGEND

1	BB-1 MARINA MAIN 190 striped
2	BB-2 MARINA EAST 80 +/- unstriped if parked perpendicular to curb (incl. 2 handicap)
3	BB-3 MARINA WEST 32 auto striped 23 trailer striped

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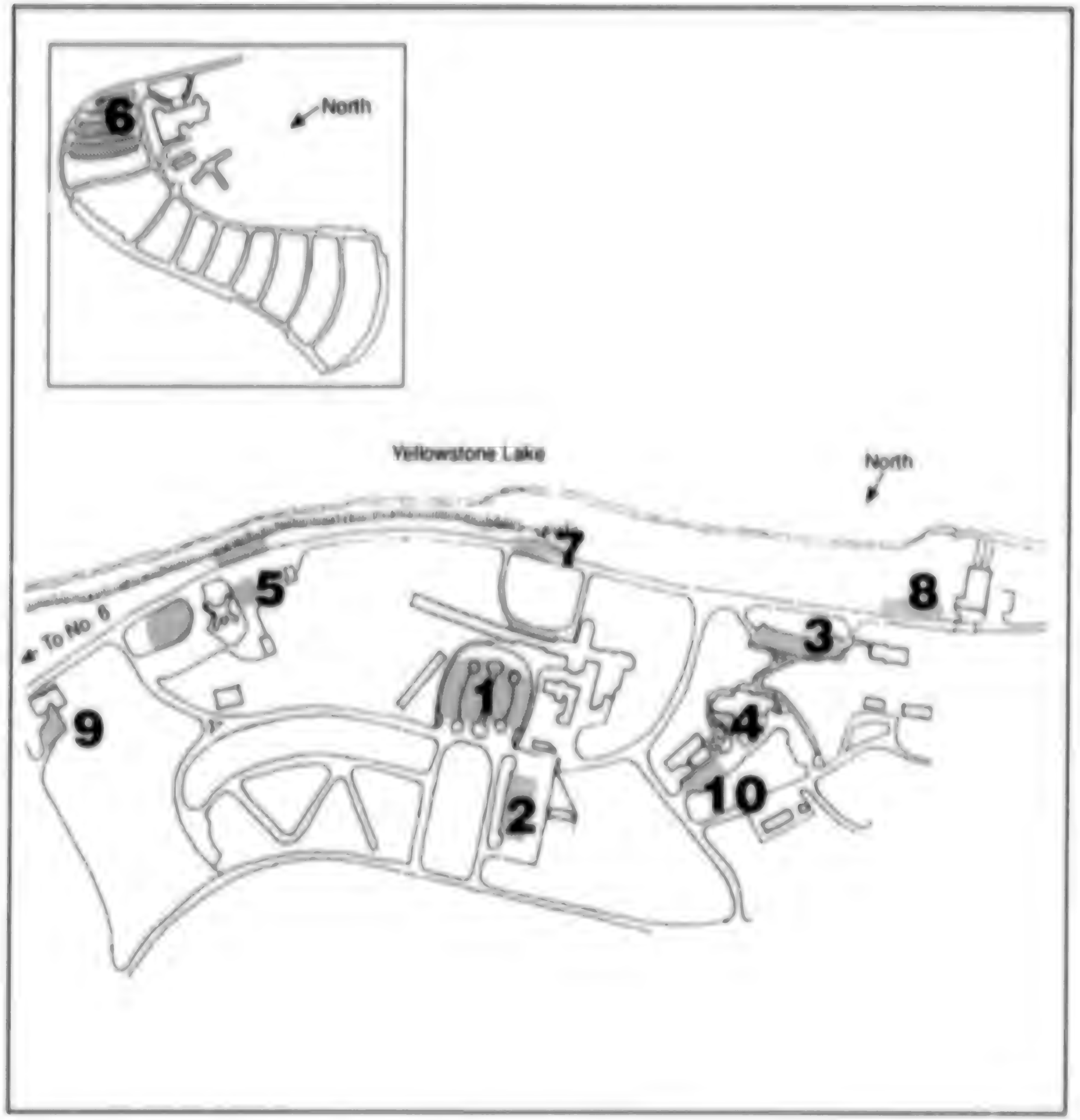
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY



LAKE AREA

LEGEND

1	L-1 HOTEL 108 spaces
2	L-2 OVERFLOW 69 spaces
3	L-3 HOSPITAL (Lower) 52 spaces
4	L-4 HOSPITAL (Upper) 15 spaces
5	L-5 HAMILTON STORE 58 spaces
6	L-6 LAKE LODGE 120 spaces
7	L-7 LAKE OVERLOOK NORTH 20 spaces
8	L-8 LAKE OVERLOOK SOUTH 20 spaces
9	L-9 RANGER STATION 14 spaces
10	L-10 HOSPITAL DORM 20 spaces

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MODES FEASIBLITY STUDY
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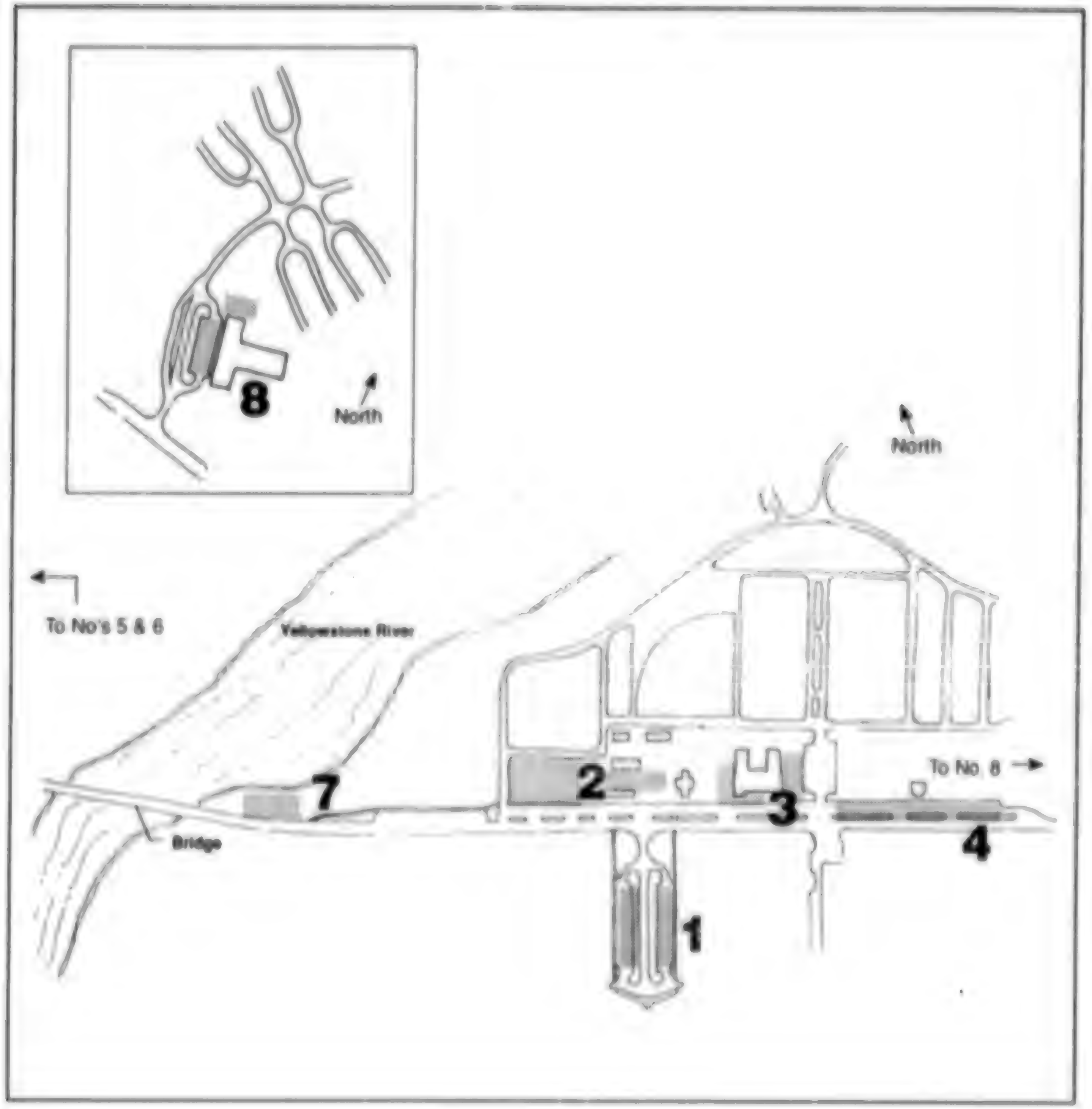

FISHING BRIDGE

LEGEND

1	FB-1 VISITOR CENTER 90 spaces
2	FB-2 SERVICE STATION 80 spaces
3	FB-3 HAMILTON STORE 59 spaces
4	FB-4 FRONTAGE ROAD 23 spaces
5	FB-5 BRIDGE LOT #1 200 spaces
6	FB-6 BRIDGE LOT #2 20 spaces
7	FB-7 BRIDGE LOT #3 40 spaces
8	FB-8 RV PARK 43 spaces

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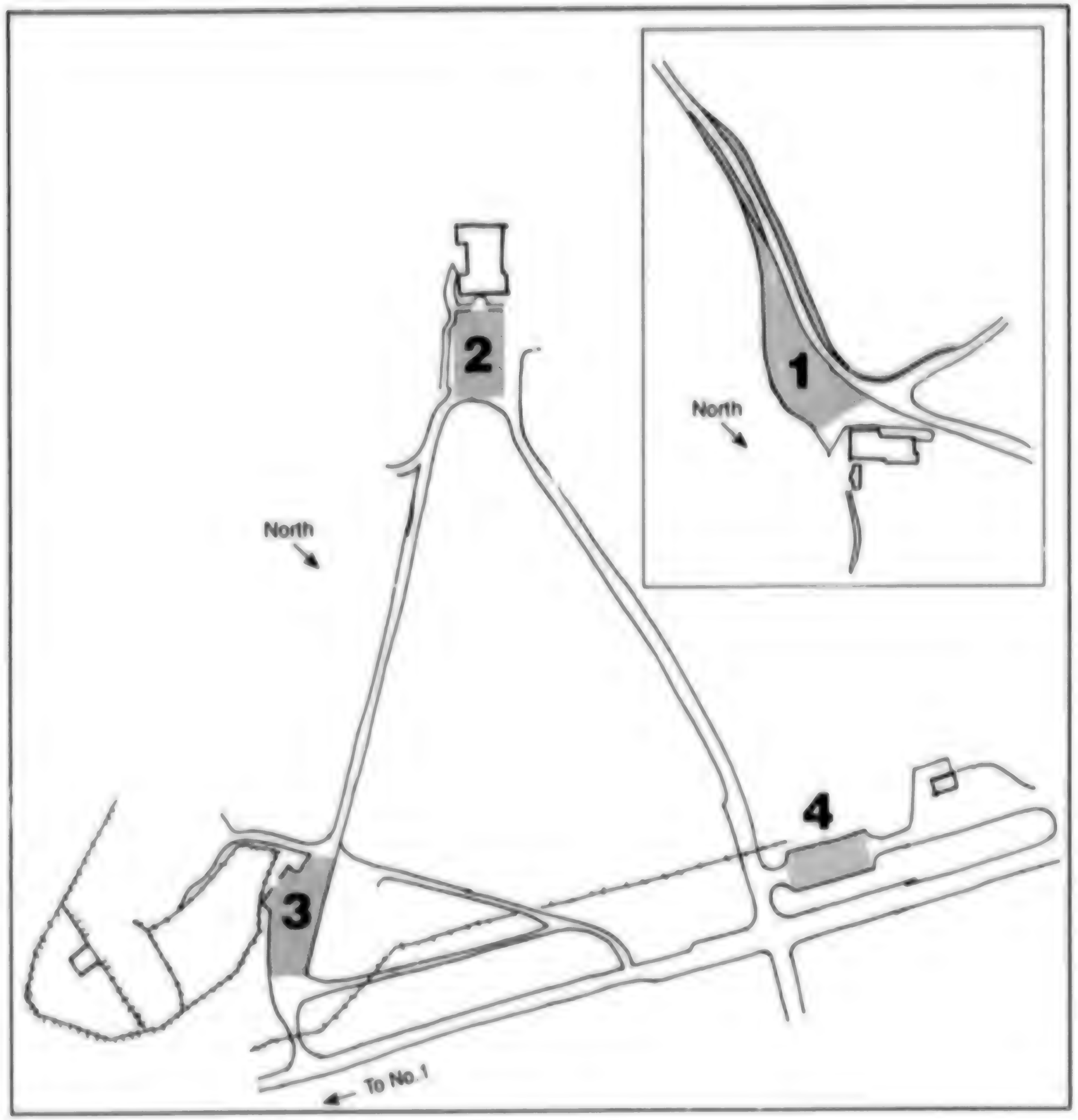
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

TOWER FALL & TOWER JUNCTION



LEGEND

1	TR-1 TOWER FALLS 53 striped 40 parallel
2	TR-2 LODGE 30 spaces
3	TR-3 HORSE CORRAL 45 spaces
4	TR-4 SERVICE STATION 15 spaces

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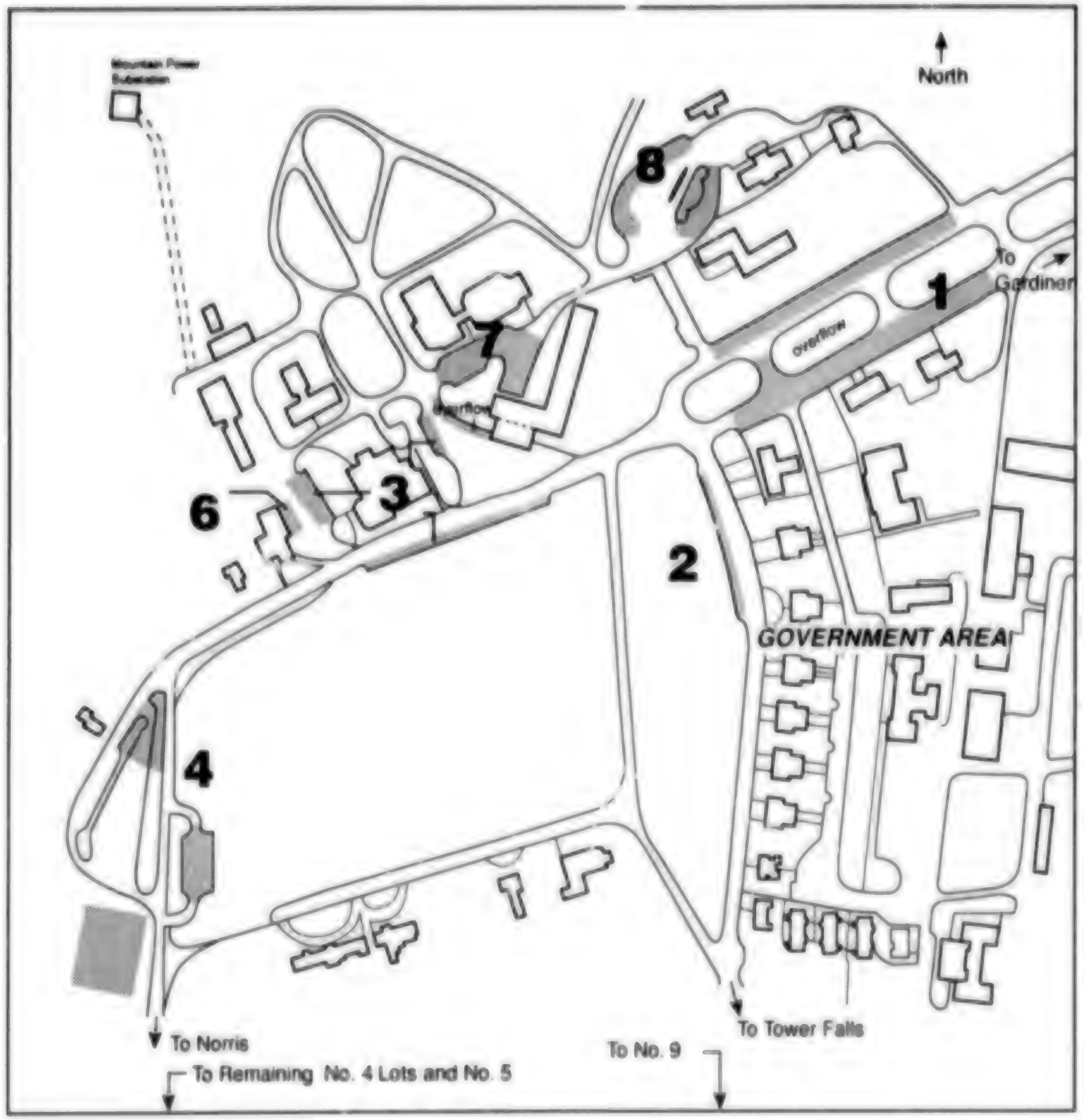
ALTERNATIVE TRANSPORTATION
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



MAMMOTH HOT SPRINGS

LEGEND

1	MHS-1 POST OFFICE/CLINIC 53 striped 25 unstriped + overflow
2	MHS-2 VISITOR CENTER 31 striped
3	MHS-3 FOOD SERVICES 20 striped 40 unstriped
4	MHS-4 LOWER TERRACE Complex, 96 spaces total 5 lots
5	MHS-5 UPPER TERRACE 52 spaces total
6	MHS-6 HAMILTON STORE 12 total
7	MHS-7 HOTEL 45 striped + overflow
8	MHS-8 RESIDENTIAL AREA 64 unstriped
9	MHS-9 CHAPEL 28 striped

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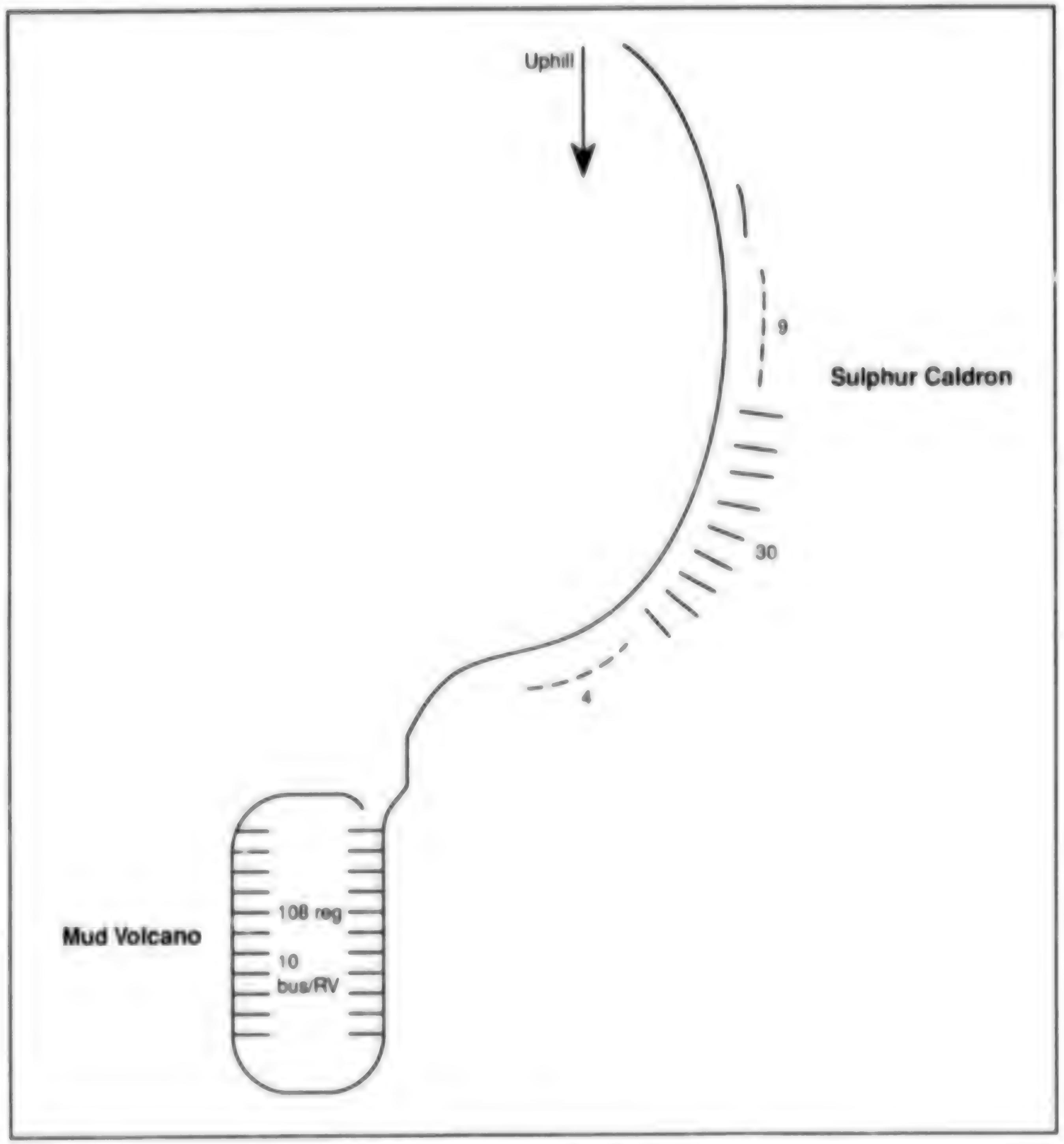
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



MUD VOLCANO/ SULPHUR CALDRON

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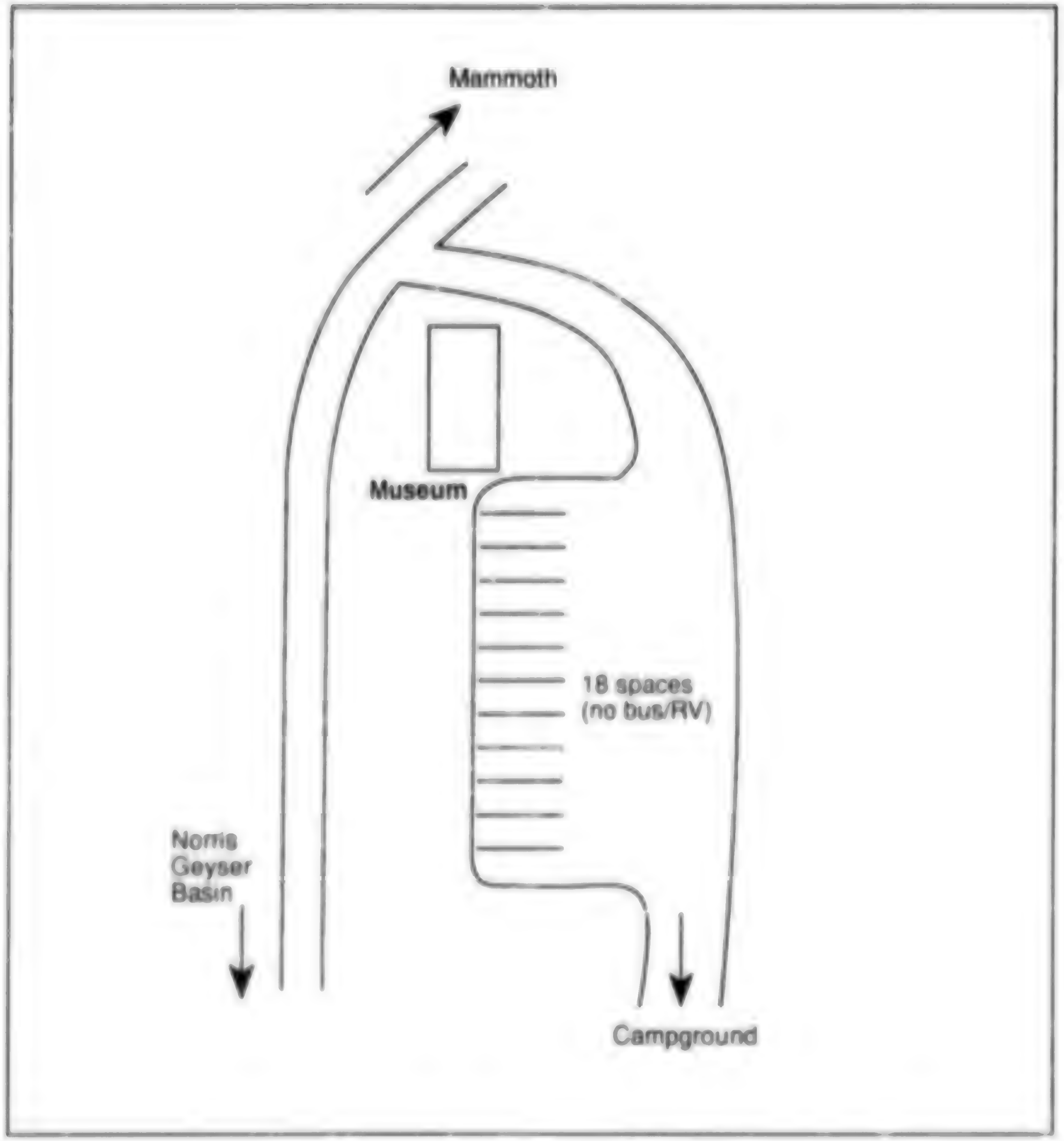
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



MUSEUM OF THE NATIONAL PARK RANGER

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MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

APPENDIX C: Parking Lot Occupancy Count Raw Data

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PARKING INVENTORY - OLD FAITHFUL DEVELOPED AREA

Date 8/13/92 - 8/14/92

			Observation Times											
			8/13/92 11:00AM				8/14/92 1:00PM				8/14/92 2:40PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
West Lot	1	180	8	2	0		25	3	4		26	2	2
Visitor Center	2	104	67	0	0		96	0	0		85	0	0
Inn - Rear	3	7	5	0	0		6	0	0		3	0	0
East Lot	4	487	325	NC	NC		379	55	0		330	61	0
Southeast Lot	5	45	25	5	0		40	2	0		35	1	0
Northeast Lot	6	102	107	2	0		107	3	0		104	1	0
Snowlodge - North	7	36	34	0	0		33	0	0		34	0	0
Snowlodge - Front/West	8	70	45	0	0		58	0	0		54	0	0
Hamilton Store - Side	9	21	18	1	0		21	3	0		20	1	0
Lodge - West	10	80	80	0	0		78	0	0		67	0	1
Lodge Rear	11	80	70	0	0		62	0	0		39	0	0
Inn - Main	12	175	143	6	0		135	8	1		155	10	2
Hamilton Store/Inn	13	50	47	2	0		41	2	0		41	0	0
NC: not counted														

Weather Conditions	Clear		

Comments/Observations:

- 8/13/92: In East Lot, the back few rows were designated for RV's but were not necessarily striped large enou
- RV's and buses took up two parking spaces.
- 8/13/92 Old Faithful erupted at 12:35 pm. Only occupancies at Inn may reflect post eruption conditions.
- 8/14/92 Eruptions occurred at approximately 2:20 and 3:30 during surveys.

PARKING INVENTORY - ROAD SEGMENT NO. 11

Date: 8/13/92 - 8/14/92

			Observation Times											
			8/14/92 11:45AM				8/13/92 1:25PM							
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus					
Lot Name	Lot Type	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.					
Kepler Cascades	View Point	27(5)	20	3	0		18	0	0					
Lone Star Trailhead	Trail Access	22	14	0	0		19	0	0					
Delacy Creek Trailhead	Trail Access	25	10	0	0		20	0	0					
Shoshone Point	Overlook	16(5)	3	1	0		3	0	0					

Weather Conditions	Clear

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses included in total

PARKING INVENTORY - GRANT VILLAGE

Date: 8/13/92 - 8/14/92

			Observation Times										
			8/14/92 10:40AM				8/13/92 2:35PM						
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus				
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.				
Visitor Center	GV-1	137	45	4	0		32	1	0				
Post Office/Restaurant	GV-2	115	15	1	0		24	0	0				
Lodge Guest Registration	GV-3	46(2)	13	0	0		14	0	0				
Hamilton Store Main	GV-4	114(6)	60	4	0		21	4	0				
Hamilton Store Rear	GV-5	36	18	1	0		20	0	0				
Hamilton Mini Store	GV-6	12	5	0	0		4	0	0				
Lodge Guest South	GV-7	132(6)	4	0	0		6	0	0				
Lodge Guest North	GV-8	113(6)	12	0	0		18	0	0				
Camper Services	GV-9	70	37	5	0		8	0	0				
Campground Entrance	GV-10	6	2	0	0		4	0	0				

Weather Conditions	Clear

Comments/Observations:

8/13/92 - 8/14/92

- (#) indicates spaces designated or striped for RV's or buses included in total.
- The campground in Grant Village was always full.
- Activity & parking occupancy was light for both days in comparison to overall capacity of facilities.
- The Hamilton store & camper services lots were the only locations which showed a significant difference in use on 8/14/92 compared to 8/13/92. These were the two busiest places on the 14th.
- The visitor center gets steady use as well but is not necessarily crowded.

PARKING INVENTORY - CANYON NORTH RIM, CANYON SOUTH RIM

Date: 8/16/92

			Observation Times											
			8/16/92 4:30PM				8/16/92 5:15PM							
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus					
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.					
Upper Falls (N)	CSR-1	82	26	3	0		23	1	0					
Uncle Tom's Trail (S)	CSR-2	128	42	3	1		20	1	0					
Wapiti Trail Head (S)	CSR-3	50	4	0	0		2	0	0					
Artist Point (S)	CSR-4	120	51	2	2		35	6	0					
Inspiration Point (N)	CNR-1	46	23	2	0		20	1	0					
Grandview Point (N)	CNR-2	35	23	4	0		20	2	0					
Lookout Point (N)	CNR-3	28	20	0	0		15	1	0					
Brink of Lower Falls (N)	CNR-4	100	47	2	0		31	0	0					

Weather Conditions	Cloudy,cool

Comments/Observations

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PARKING INVENTORY - CANYON NORTH RIM, CANYON SOUTH RIM

Date: 8/14/92

			Observation Times										
			8/14/92 11:00AM				8/14/92 1:00PM						
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus				
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.				
Upper Falls (N)	CSR-1	82	30	4	NC		42	2	NC				
Uncle Tom's Trail (S)	CSR-2	128	33	2	NC		76	6	NC				
Wapiti Trail Head (S)	CSR-3	50	2	NC	NC		15	NC	NC				
Artist Point (S)	CSR-4	120	35	NC	NC		65	NC	NC				
Inspiration Point (N)	CNR-1	48	35	NC	NC								
Grandview Point (N)	CNR-2	35	35	NC	NC								
Lookout Point (N)	CNR-3	28	19	NC	NC								
Brink of Lower Falls (N)	CNR-4	100	40	NC	NC								
NC = Not counted													

Weather Conditions:	Sunny, hot

Comments/Observations:

PARKING INVENTORY - CANYON VILLAGE

Date: 8/14/92 - 8/16/92

			Observation Times									
			8/14/92 10:30AM				8/16/92 11:00AM				8/14/92 2:00PM	
			Total Veh.	Incl. RV's			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
Visitor Center	CV-1	447	138	NC	NC		150	NC	NC		269	NC	NC
Camper Services	CV-2	55	40	NC	NC						16	NC	NC
			8/14/92 3:00PM				8/16/92 4:30PM				8/16/92 5:15PM		
Visitor Center	CV-1	447	242	NC	NC		164	10	4		161	6	2
Camper Services	CV-2	55	18	NC	NC		23	4	0		28	5	0
							8/16/92 11:00AM				8/16/92 1:00PM		
Canyon Corral	CV-3	55					15	0	0		14	3	0
NC = Not counted													

Weather Conditions:	8/14/92 Sunny, hot 8/16/92 Cloudy, cool, some rain

Comments/Observations:

PARKING INVENTORY - WEST THUMB GEYSER BASIN

Date: 8/13/92 - 8/14/92

			Observation Times										
			8/14/92 9:40AM				8/13/92 2:35PM				8/13/92 4:30PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
West Thumb Geyser													
Basin		101 (4)	27	2	0		29	3	0		29	3	0

Weather Conditions	Clear

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses included in total

PARKING INVENTORY - BRIDGE BAY DEVELOPED AREA/LAKE DEVELOPED AREA

Date 8/13/92 - 8/14/92 - 8/17/92

			Observation Times										
			8/14/92 9:40AM				8/17/92 10:30AM				8/13/92 4:30PM		
			Total Veh.	Incl. RV's	Incl. Boat Trailer		Total Veh.	Incl. RV's	Incl. Boat Trailer		Total Veh.	Incl. RV's	Incl. Boat Trailer
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
Bridge Bay Marina-Main	BB-1	190	98	9	25		93	NC	NC		106	9	23
Bridge Bay Marina-East	BB-2	80	11	5	0		10	NC	NC		14	4	0
Bridge Bay Marina-West	BB-3	55	18	0	8		30	NC	NC		23	0	0
			8/17/92 11:00AM										
			Total Veh.	Incl. RV's	Incl. Bus								
Lake Hotel (Rear Lot)	L-1	108	30	NC	NC								
Overflow (Post Office)	L-2	69	32	NC	NC								
Hospital (Lower Lot)	L-3	52	25	NC	NC								
Hospital (Upper Lot)	L-4	15	2	NC	NC								
Hamilton Store	L-5	58	21	NC	NC								
Lake Lodge	L-6	120	43	NC	NC								
NC: not counted													

Weather Conditions	

Comments/Observations:

- In Bridge Bay Marina lots the RV's and boat trailers take up two parking spaces
- Campground at Bridge Bay was always full
- Light activity at Marina

PARKING INVENTORY - ROAD SEGMENT NO. 6

Date: 8/16/92

			Observation Times										
			8/16/92 2:45PM										
			Total Veh.	Incl. RV's	Incl. Bus								
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.								
Petrified Tree		15	10	0	0								
Roosevelt Lodge	TR-2	30	25	1	0								
Calcite Springs		30	24	2	0								
Tower Fall/Store Lot	TR-1	53(12)	70	4	0								
Tower Fall/Store Strip	TR-1	40	44	1	0								
Chittenden Road, Mt. Washburn Trailhead		80	11	0	0								
							8/17/92 9:00AM				8/17/93 6:00PM		
							Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Service Station	TR-4	15					3	0	0		15	0	0
NC: not counted													

Weather Conditions:	Overcast

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses
- Tower Fall/Store Strip parking capacity based on auto occupancy. East side of road contains approximately 12 designated spaces. West side of road designated for buses but was all being used by autos.

PARKING INVENTORY - MAMMOTH HOT SPRINGS

Date: 8/16/92

			Observation Times											
			8/16/1992 10:15AM				8/16/92 11:30AM				8/16/92 12:15PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	**Lot #**	**Total # of Spaces**	**# OCC.**	**# OCC.**	**# OCC.**		**# OCC.**	**# OCC.**	**# OCC.**		**# OCC.**	**# OCC.**	**# OCC.**
Post Office/Clinic	MHS-1	88	30	2	0		35	0	0		54	2	0
Visitor Center	MHS-2	31	24	0	0		28	0	0		28	1	0
Food Services	MHS-3	60	26	1	0		46	2	0		59	0	0
Lower Terrace Complex	MHS-4	96(5)	55	4	1		84	7	1		76	1	1
Upper Terrace Complex	MHS-5	52	14	1	0		29	0	0		41	0	0
Hamilton Store	MHS-6	12	8	0	0		13	0	0		12	0	0
Hotel/Rec. Hall	MHS-7	45	24	0	0		26	0	0		43	1	0
Residential Area	MHS-8	64	53	0	0		55	0	0		53	0	0
Chapel	MHS-9	28	0	0	0		0	0	0		0	0	0
NC: Not counted														

Weather Conditions:	Hot and Sunny

Comments/Observations:

- (#) Indicates spaces designated or striped for RV's or buses included in total.
- Overflow strip parking at hotel, at Lower Terrace lots, Upper Terrace lots and along Grand Loop road.
- Major congestion in Hamilton Store lot. Overflow parking occurring in dormitory spaces behind store.

PARKING INVENTORY - MAMMOTH HOT SPRINGS

Date: 8/12/92

			Observation Times										
			8/12/1992 5:00PM										
			Total Veh.	Incl. RV's	Incl. Bus								
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.								
Post Office/Clinic	MHS-1	83	41	0	0								
Visitor Center	MHS-2	31	24	0	0								
Food Services	MHS-3	60	58	0	0								
Lower Terrace Complex	MHS-4	96(5)	90	9	0								
Upper Terrace Complex	MHS-5	52	35	0	0								
Hamilton Store	MHS-6	12	12	0	0								
Hotel/Rec. Hall	MHS-7	45	40	0	0								
Residential Area	MHS-8	64	55	0	0								
Chapel	MHS-9	28	0	0	0								
NC: Not counted													

Weather Conditions:	Hot and Sunny

Comments/Observations:

- (#) Indicates spaces designated or striped for RV's or buses included in total.
- Strip parking occurring along median north of Visitor Center/Museum.

PARKING INVENTORY - NORRIS GEYSER BASIN

Date: 8/16/92

			Observation Times										
			8/16/1992 8:30AM				8/16/1992 9:30AM				8/16/1992 12:30PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
Norris Geyser Basin	N-1	210	35	1	2		90	NC	NC		190	NC	NC
			8/16/1992 1:30PM				8/16/1992 2:30PM						
			197	NC	NC		150	NC	NC				
NC: not counted													

Weather Conditions:	Clear

Comments/Observations:

PARKING INVENTORY - ROAD SEGMENT NO. 12

Date: 8/13/92 - 8/14/92 - 8/17/92

			Observation Times										
			8/14/92 5:45PM				8/14/92 6:50PM						
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus				
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.				
Fountain Paint Pot Trail		95 (10)	41	5	0								
Midway Geyser Basin		60	30	1	0		19	0	0				
Biscuit Basin		54(10)	29	0	0								
Black Sand Basin		27	8	0	0								
Great Fountain Geyser		13(2)	10	1	0								
White Dome Geyser		15	3	0	0								
Firehole Lake		25	10	5	0								

Weather Conditions:	Hot, Sunny and clear

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses
- 8/13/92 some strip parking occurring at Great Fountain Geyser during eruption
- 8/17/92 always 3 to 5 vehicles strip parked along Grand Loop next to Midway Geyser Basin

PARKING INVENTORY - ROAD SEGMENT NO. 12

Date: 8/13/92 - 8/14/92 - 8/17/92

			Observation Times											
			8/13/92 1:15PM				8/14/92 3:50PM				8/14/92 4:50PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
Fountain Paint Pot Trail		95 (10)					39	3	0		60	5	1
Midway Geyser Basin		60					44	4	0		25	0	0
Biscuit Basin		54(10)					44	4	0		31	5	0
Black Sand Basin		27	18	4	0		18	0	2		7	0	0
Great Fountain Geyser		13(2)					4	0	0		14	2	0
White Dome Geyser		15					3	0	0		3	2	0
Firehole Lake		25					5	0	0		3	0	0

Weather Conditions:	Hot. Sunny and clear

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses
- 8/13/92 some strip parking occurring at Great Fountain Geyser during eruption
- 8/17/92 always 3 to 5 vehicles strip parked along Grand Loop next to Midway Geyser Basin

PARKING INVENTORY - ROAD SEGMENT NO. 12

Date: 8/13/92 - 8/14/92 - 8/17/92

			Observation Times									
			8/13/92 9:00AM				8/17/92 11:30AM				8/17/92 12:15PM		
			Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus		Total Veh.	Incl. RV's	Incl. Bus
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.		# OCC.	# OCC.	# OCC.
Fountain Paint Pot Trail		95 (10)	41	6	0		90	6	2		94	6	0
Midway Geyser Basin		60	28	1	0		53	3	2		59	4	1
Biscuit Basin		54(10)	16	0	0		41	6	0		38	4	0
Black Sand Basin		27	11	0	0		20	3	0		18	2	0
Great Fountain Geyser		13(2)	14	0	1		2	0	0		10	2	0
White Dome Geyser		15	1	0	0		5	2	0		8	1	0
Firehole Lake		25	5	0	0		9	0	0		13	1	0

Weather Conditions:	Hot, sunny and clear

Comments/Observations:

- (#) indicates spaces designated or striped for RV's or buses
- 8/13/92 some strip parking occurring at Great Fountain Geyser during eruption
- 8/17/92 always 3 to 5 vehicles strip parked along Grand Loop next to Midway Geyser Basin

PARKING INVENTORY - ROAD SEGMENT NO.3

Date: 8/13/92 - 8/14/92

			Observation Times										
			8/13/1992 1:40PM										
			Total Veh.	Incl. RV's	Incl. Bus								
Lot Name	Lot #	Total # of Spaces	# OCC.	# OCC.	# OCC.								
River access E. side of	Gen. use	18	16	0	0								
road at state line													
River access W. side of	Gen. use	20	15	0	0								
road at state line													

Weather Conditions:	Clear

Comments/Observations:

APPENDIX D: Parking Lot Occupancy Count Summaries

YELLOWSTONE NATIONAL PARK
OCCUPANCY SUMMARY

OLD FAITHFUL DEVELOPMENT

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied*	Percentage Occupied	Comments
1 West Lot	180	11:00 am	10	5.56%	2 R.V.
		1:00 pm	32	17.78%	4 Bus, 3 R.V.
		2:40 pm	30	16.67%	2 Bus, 2 R.V.
2 Visitor Center	104	11:00 am	87	83.65%	Cars Only
		1:00 pm	96	92.31%	Cars Only
		2:40 pm	85	81.73%	Cars Only
3 Inn (Rear)	7	11:00 am	5	71.43%	Cars Only
		1:00 pm	6	85.71%	Cars Only
		2:40 pm	3	42.86%	Cars Only
4 East Lot	487	11:00 am	375	77.00%	Mixed Vehicles
		1:00 pm	434	89.12%	55 R.V.
		2:40 pm	391	80.29%	61 R.V.
5 Southeast Lot	45	11:00 am	30	66.67%	5 R.V.
		1:00 pm	42	93.33%	2 R.V.
		2:40 pm	36	80.00%	1 R.V.
6 Northeast Lot	102	11:00 am	109	106.86%	2 R.V.
		1:00 pm	110	107.84%	3 R.V.
		2:40 pm	105	102.94%	1 R.V.
7 Snowlodge North	36	11:00 am	34	94.44%	Cars Only
		1:00 pm	33	91.67%	Cars Only
		2:40 pm	34	94.44%	Cars Only
8 Snowlodge Front/West	70	11:00 am	45	64.29%	Cars Only
		1:00 pm	58	82.86%	Cars Only
		2:40 pm	54	77.14%	Cars Only

Source: BRW, Inc. August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

OLD FAITHFUL DEVELOPMENT

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied*	Percentage Occupied	Comments
9. Hamilton Store	21	11:00 am	19	90.48%	1 R.V.
		1:00 pm	24	114.29%	3 R.V.
		2:40 pm	21	100.00%	1 R.V.
10. Lodge West	80	11:00 am	80	100.00%	Cars Only
		1:00 pm	78	97.50%	Cars Only
		2:40 pm	68	85.00%	1 Bus
11. Lodge Rear	80	11:00 am	70	87.50%	Cars Only
		1:00 pm	62	77.50%	Cars Only
		2:40 pm	39	48.75%	Cars Only
12. Inn Main	175	11:00 am	149	85.14%	6 R.V.
		1:00 pm	144	82.29%	1 Bus, 8 R.V.
		2:40 pm	167	95.43%	2 Bus, 10 R.V.
13. Hamilton Store/Inn	50	11:00 am	49	98.00%	2 R.V.
		1:00 pm	43	86.00%	2 R.V.
		2:40 pm	41	82.00%	Cars Only

* R.V.'s and buses occupied two parking spaces

Source, SRW, Inc. August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

ROAD SEGMENT 11

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Kepler Cascades	27	11:45 am	20	74.07%	3 R.V.
		1:25 pm	18	66.67%	Cars Only
2. Lone Star Trailhead	22	11:45 am	14	63.64%	Cars Only
		1:25 pm	19	86.36%	Cars Only
3. Delacy Creek Trailhead	25	11:45 am	10	40.00%	Cars Only
		1:25 pm	20	80.00%	Cars Only
4. Shoshone Point	16	11:45 am	3	18.75%	1 R.V.
		1:25 pm	3	18.75%	Cars Only

Source: [illegible] Ltd. August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

CANYON VILLAGE

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Visitor Center	447	10:30 am	138	30.87%	Mixed Vehicles
		11:00 am	150	33.56%	Mixed Vehicles
		2:00 pm	269	60.18%	Mixed Vehicles
		3:00 pm	242	54.14%	Mixed Vehicles
		4:30 pm	164	36.69%	4 Bus, 10 R.V
		5:15 pm	161	36.02%	2 Bus, 6 R.V
2. Camper Services	55	11:00 am	40	72.73%	Mixed Vehicles
		2:00 pm	16	29.09%	Mixed Vehicles
		3:00 pm	18	32.73%	Mixed Vehicles
		4:30 pm	23	41.82%	4 R.V.
		5:15 pm	26	47.27%	3 R.V.
3. Canyon Horse Corral	55	11:00 pm	15	27.27%	Cars Only
		1:00 pm	14	25.45%	3 R.V.

[illegible]

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

NORTH & SOUTH CANYON RIMS

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Upper Falls (N)	82	11:00 am	30	36.59%	4 R.V.
		1:00 pm	42	51.22%	2 R.V.
		4:30 pm	28	34.15%	3 R.V.
		5:15 pm	23	28.05%	1 R.V.
2. Uncle Tom's Trail (S)	128	11:00 am	33	25.78%	2 R.V.
		1:00 pm	76	59.38%	6 R.V.
		4:30 pm	42	32.81%	1 Bus, 3 R.V.
		5:15 pm	20	15.63%	1 R.V.
3. Wapiti Trailhead (S)	50	11:00 am	2	4.00%	Mixed Vehicles
		1:00 pm	15	30.00%	Mixed Vehicles
		4:30 pm	4	8.00%	Cars Only
		5:15 pm	2	4.00%	Cars Only
4. Artist Point (S)	120	11:00 am	35	29.17%	Mixed Vehicles
		1:00 pm	65	54.17%	Mixed Vehicles
		4:30 pm	51	42.50%	2 Bus, 2 R.V.
		5:15 pm	35	29.17%	6 R.V.
5. Inspiration Point (N)	48	11:00 am	35	72.92%	Mixed Vehicles
		4:30 pm	23	47.92%	2 R.V.
		5:15 pm	20	41.67%	1 R.V.
6. Grandview Point (N)	35	11:00 am	35	100.0%	Mixed Vehicles
		4:30 pm	23	65.71%	4 R.V.
		5:15 pm	20	57.14%	2 R.V.
7. Lookout Point (N)	28	11:00 am	19	67.86%	Mixed Vehicles
		4:30 pm	20	71.43%	Cars Only
		5:15 pm	15	53.57%	1 R.V.
8. Brink of Lower Falls (N)	100	11:00 am	40	40.00%	Mixed Vehicles
		4:30 pm	47	47.00%	2 R.V.
		5:15 p.m	31	31.00%	Cars Only

Source: BRW, Inc. August 13, 14 & 15, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

GRANT VILLAGE

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. GV Visitor Center	137	10:40 am	45	32.85%	4 R.V.
		2:35 pm	32	21.77%	1 R.V.
2. GV Post Office/Restaurant	115	10:40 am	15	13.04%	1 R.V.
		2:35 pm	24	20.87%	Cars Only
3. GV Lodge Guest Reg	46	10:40 am	13	28.26%	Cars Only
		2:35 pm	14	30.43%	Cars Only
4. GV Hamilton Store Main	114	10:40 am	60	52.63%	4 R.V.
		2:35 pm	21	18.42%	4 R.V.
5. GV Hamilton Store Rear	36	10:40 am	18	50.00%	1 R.V.
		2:35 pm	20	55.56%	Cars Only
6. GV Hamilton Mini Store	12	10:40 am	5	41.67%	Cars Only
		2:35 pm	4	33.33%	Cars Only
7. GV Lodge Guest Pkg S	132	10:40 am	4	3.03%	Cars Only
		2:35 pm	6	4.55%	Cars Only
8. GV Lodge Guest Pkg N	113	10:40 am	12	10.62%	Cars Only
		2:35 pm	18	15.93%	Cars Only
9. GV Camper Services	70	10:40 am	37	52.86%	5 R.V.
		2:35 pm	8	11.43%	Cars Only
10. GV Campground Entrance	6	10:40 am	2	33.33%	Cars Only
		2:35 pm	4	66.67%	Cars Only

W. Thumb Geyser Basin	101	9:40 am	27	26.73%	2 R.V.
		2:35 pm	29	28.71%	3 R.V.
		4:30 pm	29	28.71%	3 R.V.

[illegible] August 13, 14 & 15, [illegible]

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

BRIDGE BAY MARINA

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied*	Percentage Occupied	Comments
1. Bridge Bay Marina Main	190	9:40 am	132	69.47%	23 Trailer, 9 R.
		10:30 am	127	66.84%	Mixed Vehicles
		4:30 pm	138	72.63%	23 Trailer, 9 R.V
2. Bridge Bay Marina East	80	9:40 am	16	20.00%	5 R.V
		10:30 am	10	12.50%	Mixed Vehicles
		4:30 pm	18	22.50%	4 R.V
3. Bridge Bay Marina West	55	9:40 am	26	47.27%	8 Trailer
		10:30 am	30	54.55%	Mixed Vehicles
		4:30 pm	23	41.82%	Cars Only

* R.V.'s and trailers occupied two parking spaces

[illegible] August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

LAKE DEVELOPED AREA

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Lake Hotel Rear	108	11:00 am	30	27.78%	Mixed Vehicles
2. Lake Post Office	69	11:00 am	32	46.38%	Mixed Vehicles
3. Lake Hospital Lower	52	11:00 am	25	48.08%	Mixed Vehicles
4. Lake Hospital Upper	15	11:00 am	2	13.33%	Mixed Vehicles
5. Lake Hamilton Store	58	11:00 am	21	36.21%	Mixed Vehicles
6. Lake Lodge	120	11:00 am	43	35.83%	Mixed Vehicles

Source: BRW, Inc., August 13, 14 & 15, 1993

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

TOWER/ROOSEVELT AND ROAD SEGMENT 6

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Tower Fall/Store Lot	53	2:45 pm	70	132.0%	4 R.V.
Tower Fall/Store Strip	40	2:45 pm	44	110.0%	1 R.V.
2. Roosevelt Lodge	30	2:45 pm	25	83.33%	1 R.V.
Petrified Tree	15	2:45 pm	10	66.67%	Cars Only
3. Service Station	15	8:00 am	3	20.00%	Cars Only
		6:00 pm	15	100.0%	1 R.V.
Calcite Springs	30	2:45 pm	24	80.00%	2 R.V.
Chittenden Road, Mt. Washburn Trailhead	80	2:45 pm	11	13.75%	Cars Only

Source: BRW, Inc. August 10, 11 & 12, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

MAMMOTH HOT SPRINGS

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Post Office	88	10:15 am	30	34.09%	2 R.V.
		11:30 am	35	39.77%	Cars Only
		12:15 pm	54	61.36%	2 R.V.
		5:00 pm	41	46.59%	Cars Only
2. Visitor Center	31	10:15 am	24	77.41%	Cars Only
		11:30 am	28	90.32%	Cars Only
		12:15 pm	28	90.32%	1 R.V.
		5:00 pm	24	77.41%	Cars Only
3. Food Services	60	10:15 am	26	43.33%	1 R.V.
		11:30 am	46	76.67%	2 R.V.
		12:15 pm	59	98.33%	Cars Only
		5:00 pm	58	96.67%	Cars Only
4. Lower Terrace Complex	96	10:15 am	55	57.29%	1 Bus, 4 R.V.
		11:30 am	84	87.50%	1 Bus, 7 R.V.
		12:15 pm	76	79.17%	1 Bus, 1 R.V.
		5:00 pm	90	93.75%	9 R.V.
5. Upper Terrace Complex	52	10:15 am	14	26.92%	1 R.V.
		11:30 am	29	55.77%	Cars Only
		12:15 pm	41	78.85%	Cars Only
		5:00 pm	35	67.31%	Cars Only
6. Hamilton Store	12	10:15 am	8	66.67%	Cars Only
		11:30 am	13	108.33%	Cars Only
		12:15 pm	12	100.0%	Cars Only
		5:00 pm	12	100.0%	Cars Only

[[illegible] BRW, Inc. - August 13, 14 & 15, 1992]

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

MAMMOTH HOT SPRINGS

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
7. Hotel/Rec. Hall	45	10:15 am	24	53.33%	Cars Only
		11:30 am	26	57.78%	Cars Only
		12:15 pm	43	95.56%	1 R.V.
		5:00 pm	40	88.89%	Cars Only
8. Residential Area	64	10:15 am	53	82.81%	Cars Only
		11:30 am	55	85.94%	Cars Only
		12:15 pm	53	82.81%	Cars Only
		5:00 pm	55	85.94%	Cars Only
9. Chapel	28	10:15 am	0	00.00%	
		11:30 am	0	00.00%	
		12:15 pm	0	00.00%	
		5:00 pm	0	00.00%	

Source: BRW, Inc. August 13, 14 & 15, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

NORRIS GEYSER BASIN

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Norris Geyser Basin	210	8:30 am	35	16.67%	2 Bus, 1 R.V.
		9:30 am	90	42.86%	Mixed Vehicles
		12:30 pm	190	90.48%	Mixed Vehicles
		1:30 pm	197	93.81%	Mixed Vehicles
		2:30 pm	150	71.43%	Mixed Vehicles

Source: BRW Inc., August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

ROAD SEGMENT 12 AND FIREHOLE LAKE DRIVE

Parking Lot Description	Total Spaces Availble	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
1. Fountain Paint Pot Trail	95	9:00 am	41	43.16%	6 R.V.
		11:30 am	90	94.74%	2 Bus, 6 R.V.
		12:15 pm	94	98.95%	6 R.V.
		3:50 pm	39	41.05%	3 R.V.
		4:50 pm	60	63.16%	1 Bus, 5 R.V.
		5:45 pm	46	48.42%	5 R.V.
2. Midway Geyser Basin	60	9:00 am	28	46.67%	1 R.V.
		11:30 am	53	88.33%	2 Bus, 3 R.V.
		12:15 pm	59	98.33%	1 Bus, 4 R.V.
		3:50 pm	44	73.33%	4 R.V.
		4:50 pm	25	41.67%	10 R.V.
		5:45 pm	30	50.00%	1 R.V.
		6:50 pm	19	31.67%	Cars Only
3. Biscuit Basin	54	9:00 am	16	29.36%	Cars Only
		11:30 am	41	75.93%	6 R.V.
		12:15 pm	38	70.37%	4 R.V.
		3:50 pm	44	81.48%	4 R.V.
		4:50 pm	31	57.41%	5 R.V.
		5:45 pm	29	53.70%	Cars Only
4. Black Sand Basin	27	9:00 am	11	40.74%	Cars Only
		11:30 am	20	74.07%	3 R.V.
		12:15 pm	18	66.67%	2 R.V.
		1:15 pm	18	66.67%	4 R.V.
		3:50 pm	18	66.67%	2 Bus
		4:50 pm	7	25.93%	Cars Only
		5:45 pm	8	29.63%	Cars Only

Source: BRW, Inc. August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

ROAD SEGMENT 12 AND FIREHOLE LAKE DRIVE

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
5. Great Fountain Geyser	13	9:00 am	14	107.69%	1 Bus
		11:30 am	2	15.38%	Cars Only
		12:15 pm	10	76.92%	2 R.V.
		3:50 am	4	30.77%	Cars Only
		4:50 pm	14	107.69%	2 R.V.
		5:45 pm	10	76.92%	1 R.V.
6. White Dome Geyser	15	9:00 am	1	6.67%	Cars Only
		11:30 am	5	33.33%	2 R.V.
		12:15 pm	8	53.33%	1 R.V.
		3:50 pm	3	20.00%	Cars Only
		4:50 pm	3	20.00%	2 R.V.
		5:45 pm	3	20.00%	Cars Only
7. Firehole Lake	25	9:00 am	5	20.00%	Cars Only
		11:30 am	9	36.00%	Cars Only
		12:15 pm	13	52.00%	1 R.V.
		3:50 pm	5	20.00%	Cars Only
		4:50 pm	3	12.00%	Cars Only
		5:45 pm	10	40.00%	5 R.V.

YELLOWSTONE NATIONAL PARK

OCCUPANCY SUMMARY

MADISON JUNCTION

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied	Percentage Occupied	Comments
Explorers Museum	56	8:00 am	3	5.36%	Cars Only
		6:00 pm	15	26.79%	1 R.V.

Source: BRW, Inc. August 13, 14 & 17, 1992

YELLOWSTONE NATIONAL PARK

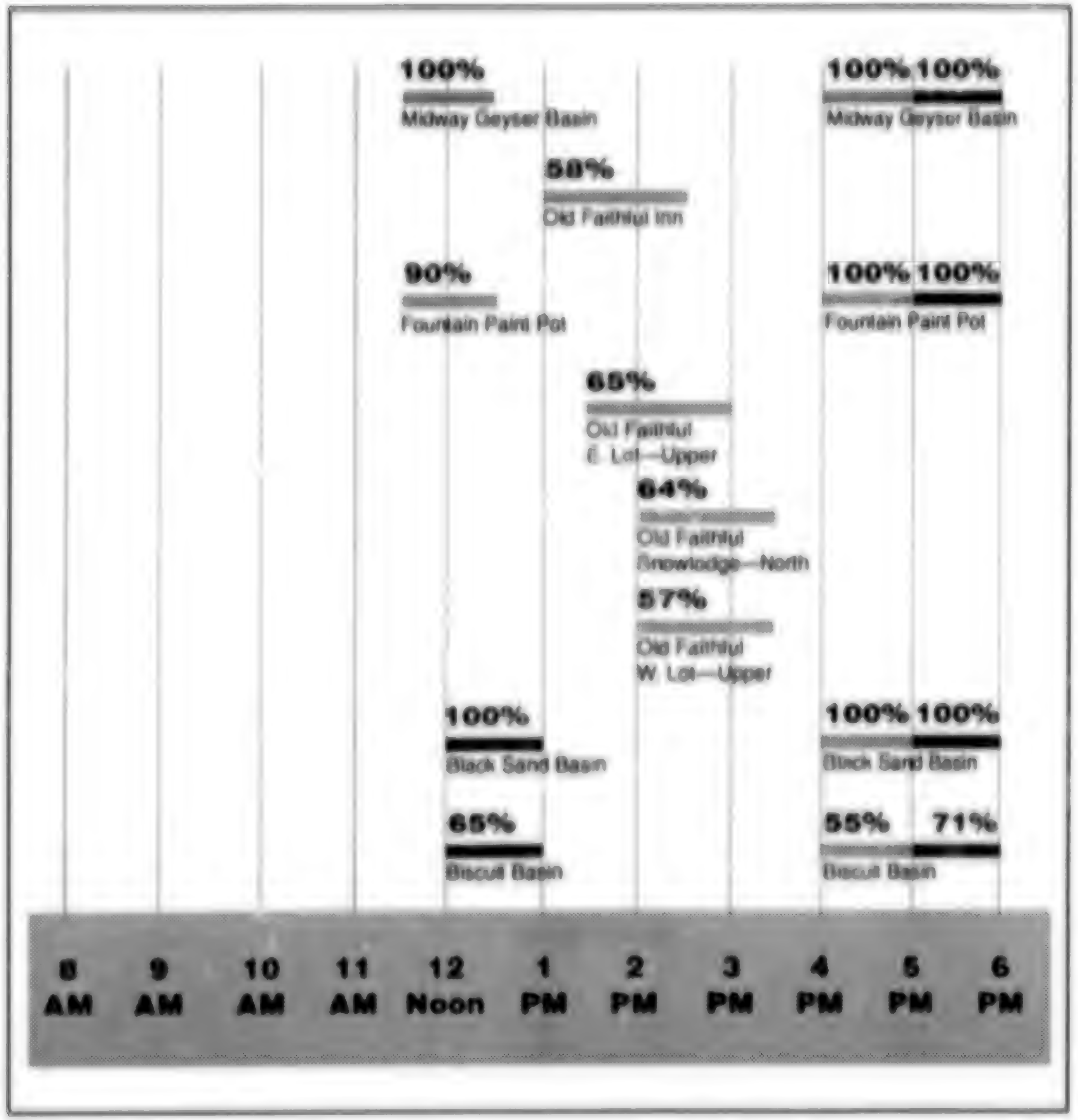
OCCUPANCY SUMMARY

ROAD SEGMENT 3

Parking Lot Description	Total Spaces Available	Sampling Times	Total Spaces Occupied*	Percentage Occupied	Comments
River access, east side of road at state line	18	1:40 pm	18	100.0%	Cars Only
River access, west side of road at state line	15	1:40 pm	15	75.0%	Cars Only

[illegible] August 13, 14 & 15, 1992

APPENDIX E: Parking Supply Turnover/Duration



PARKING SUPPLY TURNOVER Southwest Loop Area

LEGEND

▬	Time period surveyed at each location
80%	Parking Supply Turnover (reciprocal of vehicles remaining after time period shown, eg 20%)

Source: BRW, Inc. based on license plate survey conducted August 14-16, 1992

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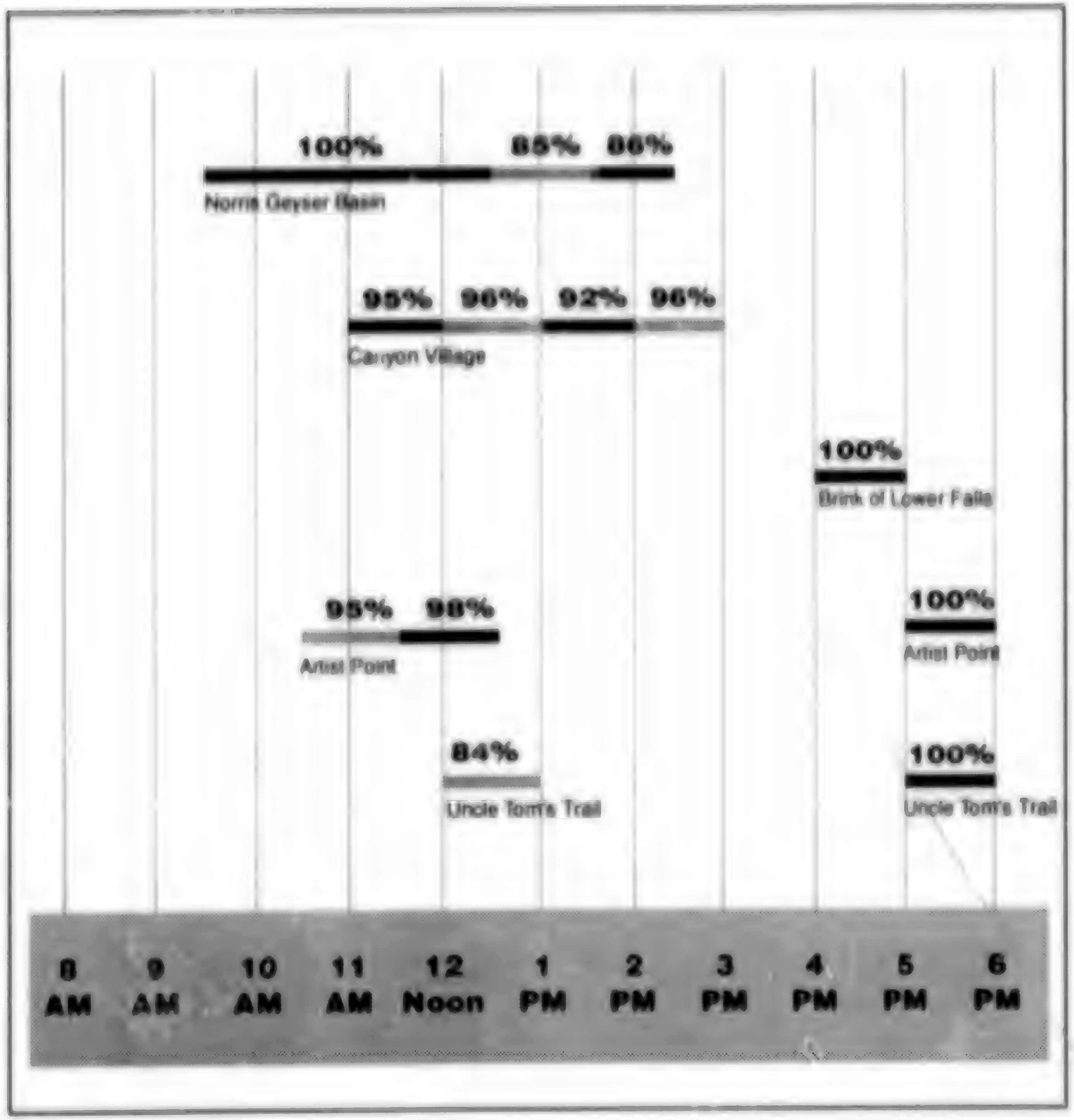
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PARKING SUPPLY TURNOVER Central Loop Area



LEGEND

▬	Time period surveyed at each location
80%	Parking Supply Turnover (reciprocal of vehicles remaining after time period shown, eg 20%)

Source: BRW, Inc. based on license plate survey conducted August 14-16, 1992

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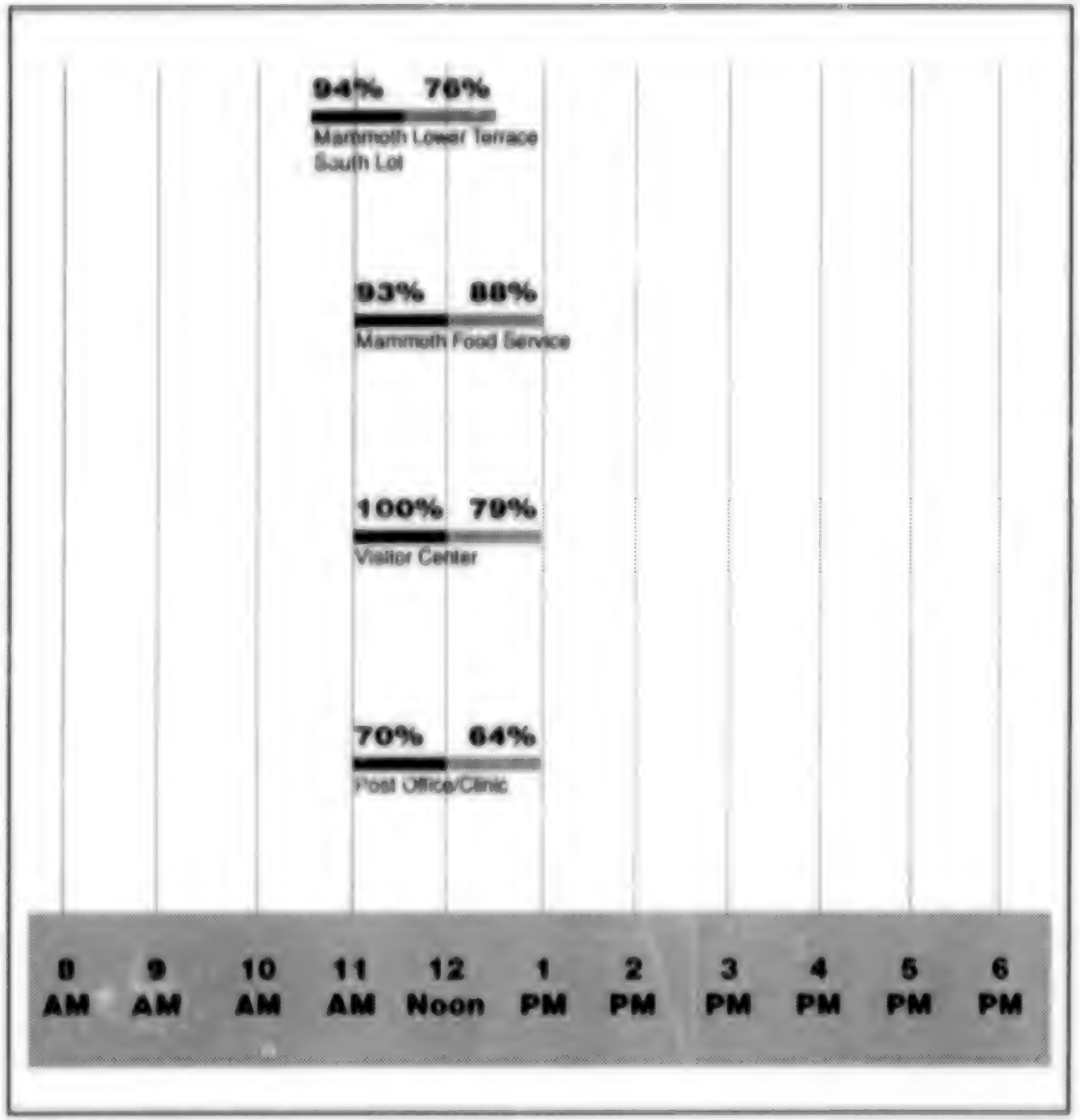
MODES FEASIBLITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



PARKING SUPPLY TURNOVER
Mammoth Area

LEGEND

▬	Time period surveyed at each location
80%	Parking Supply Turnover (reciprocal of vehicles remaining after time period shown, eg. 20%)

Source: BRW, Inc. based on license plate survey conducted August 14-16, 1992

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NATIONAL PARK
ALTERNATIVE TRANSPORTATION
MODES FEASIBILITY STUDY

APPENDIX F: Yellowstone VTS Alternative Cost Estimates

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	10 Coach Bus	$262,000	$2,620,000	$420,000	$3,040,000	$0	$3,040,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	20 Buses	$76,000	$1,520,000	$471,200	$1,991,200	$380,000	$2,371,200
Fuel Storage Tank(s)	8,000 Gal	$2.50	$20,000	$6,200	$26,200	$5,000	$31,200
West Yellowstone Parking							
– Auto	182 Spaces	$1,500	$273,000				
– RV	18 Spaces	$3,225	$58,050				
– Bus	0 Spaces	$4,150	$0				
Total	200 Spaces		$331,050	$102,626	$433,676	$82,763	$516,438
Grant Village Parking							
– Auto	110 Spaces	$1,500	$165,000				
– RV	11 Spaces	$3,225	$35,475				
– Bus	0 Spaces	$4,150	$0				
Total	121 Spaces		$200,475	$62,147	$262,622	$50,119	$312,741
Minimum Passenger Facilities:							
– Wood Platform Decking	2,880 S.F.	$10	$28,800	$8,928	$37,728	$7,200	$44,928
– Timber Shelters w/Decking (Staging Area)	2,880 S.F.	$100	$288,000	$89,280	$377,280	$72,000	$449,280
Total Capital Costs			**$5,038,325**	**$1,164,381**	**$6,202,706**	**$597,081**	**$6,799,787**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	4,360		$3.25	$14,170
Total Oper. & Maint. Costs				**$14,170**
Daily Passenger Round Trips				**1,920**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	130,800		$3.25	$425,100
Monthly Oper. & Maint. Costs				**$425,100**
Monthly Passenger Round Trips				**57,600**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$3,725,787	30	$300,248
Equipment	$3,074,000	15	$337,509
Operation and Maintenance	$2,008,596	N.A.	$2,008,596
Total Annualized Cost			$2,646,354
Total Annual Passengers			217,780
Annual Cost/Visitor			**$12.15**

Note: – Reduced Grant Village parking requirements by existing surplus supply at Grant Village Visitor Center Lot.
– Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
– Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
– Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1993.

Alternative: Hayden Valley (Between Lake Village and Canyon) Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	80 Conv. Bus	$187,500	$15,000,000	$2,400,000	$17,400,000	$0	$17,400,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	80 Buses	$76,000	$6,080,000	$1,884,800	$7,964,800	$1,520,000	$9,484,800
Fuel Storage Tank(s)	20,000 Gal	$2.50	$50,000	$15,500	$65,500	$12,500	$78,000
Lake Village Parking							
--Auto	814 Spaces	$1,500	$1,221,000				
--RV	79 Spaces	$3,225	$254,775				
--Bus	4 Spaces	$4,156	$16,624				
Total	897 Spaces		$1,492,399	$462,644	$1,955,043	$373,100	$2,328,142
Canyon Parking							
--Auto	509 Spaces	$1,500	$763,500				
--RV	50 Spaces	$3,225	$161,250				
--Bus	3 Spaces	$4,156	$12,468				
Total	562 Spaces		$937,218	$290,538	$1,227,756	$234,304	$1,462,060
Minimum Passenger Facilities							
-- Wood Platform Decking	1,920 S.F.	$10	$19,200	$5,952	$25,152	$4,800	$29,952
-- Timber Shelters w/Decking	1,920 S.F.	$100	$192,000	$59,520	$251,520	$48,000	$299,520
Total Capital Costs			$23,795,817	$5,122,953	$28,918,770	$2,192,704	$31,111,475

Daily Operation and Maintenance Costs

Daily Vehicle Miles	10,350		$3.50	$36,225
Total Oper. & Maint. Costs				$36,225
Daily Passenger Round Trips				9,005

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	310,500		$3.50	$1,086,750
Monthly Oper. & Maint. Costs				$1,086,750
Monthly Passenger Round Trips				270,150

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$13,682,475	30	$1,102,621
Equipment	$17,429,000	15	$1,913,611
Operation and Maintenance	$5,134,894	N.A.	$5,134,894
Total Annualized Cost			$8,151,126
Total Annual Passengers			1,021,167
Annual Cost/Visitor			$7.98

Note: -- Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning

Source: BRW, Inc., 1993

Transit Alternative Cost Estimates

Alternative: Hayden Valley (Between Lake Village and Canyon) Large Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	54 Lrg. Bus	$307,500	$16,605,000	$2,656,800	$19,261,800	$0	$19,261,800
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	54 Buses	$125,400	$6,771,600	$2,099,196	$8,870,796	$1,692,900	$10,563,696
Fuel Storage Tank(s)	16,000 Gal.	$2.81	$45,000	$13,950	$58,950	$11,250	$70,200
Lake Village Parking							
--Auto	814 Spaces	$1,500	$1,221,000				
--RV	79 Spaces	$3,225	$254,775				
--Bus	4 Spaces	$4,156	$16,624				
Total	897 Spaces		$1,492,399	$462,644	$1,955,043	$373,100	$2,328,142
Canyon Parking							
--Auto	509 Spaces	$1,500	$763,500				
--RV	50 Spaces	$3,225	$161,250				
--Bus	3 Spaces	$4,156	$12,468				
Total	562 Spaces		$937,218	$290,538	$1,227,756	$234,305	$1,462,060
Minimum Passenger Facilities							
-- Wood Platform Decking	3,120 S.F	$10	$31,200	$9,672	$40,872	$7,800	$48,672
-- Timber Shelters w/Decking	3,120 S.F	$100	$312,000	$96,720	$408,720	$78,000	$486,720
Total Capital Costs			$26,219,417	$5,633,519	$31,852,936	$2,397,354	$34,250,291

Daily Operation and Maintenance Costs

Daily Vehicle Miles	6,900		$3.70	$25,530
Total Oper. & Maint. Costs				$25,530
Daily Passenger Round Trips				9,005

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	207,000		$3.70	$765,900
Monthly Oper. & Maint. Costs				$765,900
Monthly Passenger Round Trips				270,150

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$14,959,491	30	$1,205,532
Equipment	$19,290,800	15	$2,118,025
Operation and Maintenance	$3,618,878	N.A.	$3,618,878
Total Annualized Cost			$6,942,435
Total Annual Passengers			1,021,187
Annual Cost/Visitor			$6.80

Note: - Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., [illegible]

Yellowstone Transit Alternative Cost Estimates

Alternative: Hayden Valley (Between Lake Village and Canyon) At - Grade Self - Propelled Rail Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	44 Trains	$3,250,000	$143,000,000	$22,880,000	$165,880,000	$0	$165,880,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Alignment	17.25 Miles	$6,000,000	$103,500,000	$32,085,000	$135,585,000	$25,875,000	$161,460,000
Maintenance Facility	44 Trains	$240,000	$10,560,000	$3,273,600	$13,833,600	$2,640,000	$16,473,600
Fuel Storage Tank(s)	75,000 Gal	$2.60	$195,000	$60,450	$255,450	$48,750	$304,200
Lake Village Parking							
- Auto	814 Spaces	$1,500	$1,221,000				
- RV	79 Spaces	$3,225	$254,775				
- Bus	4 Spaces	$4,156	$16,624				
Total	897 Spaces		$1,492,399	$462,644	$1,955,043	$373,100	$2,328,142
Canyon Parking							
- Auto	509 Spaces	$1,500	$763,500				
- RV	50 Spaces	$3,225	$161,250				
- Bus	3 Spaces	$4,156	$12,468				
Total	562 Spaces		$937,218	$290,538	$1,227,756	$234,305	$1,462,060
Minimum Passenger Facilities							
- Wood Platform Decking	4,080 S.F	$10	$40,800	$12,648	$53,448	$10,200	$63,648
- Timber Shelters w/Decking	4,080 S.F	$100	$408,000	$126,480	$534,480	$102,000	$636,480
Total Capital Costs			**$261,095,635**	**$50,195,259**	**$310,353,776**	**$29,283,354**	**$348,637,131**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	5,520		$11.00	$60,720
Total Oper. & Maint. Costs				**$60,720**
Daily Passenger Round Trips				**9,005**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	165,600		$11.00	$1,821,600
Monthly Oper. & Maint. Costs				**$1,821,600**
Monthly Passenger Round Trips				**270,150**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$182,728,131	30	$14,725,403
Equipment	$165,909,000	25	$14,236,737
Operation and Maintenance	$8,607,060	N.A.	$8,607,000
Total Annualized Cost			$37,569,200
Total Annual Passengers			1,021,167
Annual Cost/Visitor			**$36.79**

Note: - Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Hayden Valley (Between Lake Village and Canyon) Elevated Monorail Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	30 Trains	$3,900,000	$117,000,000	$18,720,000	$135,720,000	$0	$135,720,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Alignment	17.25 Miles	$26,500,000	$457,125,000	$141,708,750	$598,833,750	$114,281,250	$713,115,000
Construction of Stations	5 Stations	$1,800,000	$9,000,000	$2,790,000	$11,790,000	$2,250,000	$14,040,000
Maintenance Facility	30 Trains	$300,000	$9,000,000	$2,790,000	$11,790,000	$2,250,000	$14,040,000
Lake Village Parking							
– Auto	814 Spaces	$1,500	$1,221,000				
– RV	79 Spaces	$3,225	$254,775				
– Bus	4 Spaces	$4,156	$16,624				
Total	897 Spaces		$1,492,399	$462,644	$1,955,043	$373,100	$2,328,142
Canyon Parking							
– Auto	509 Spaces	$1,500	$763,500				
– RV	50 Spaces	$3,225	$161,250				
– Bus	3 Spaces	$4,156	$12,468				
Total	562 Spaces		$937,218	$290,538	$1,227,756	$234,305	$1,462,061
Total Capital Costs			**$594,579,617**	**$166,765,931**	**$761,345,548**	**$119,388,654**	**$880,734,203**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	3,658		$11.00	$40,238
Total Oper. & Maint. Costs				**$40,238**
Daily Passenger Round Trips				**9,005**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	109,740		$11.00	$1,207,140
Monthly Oper. & Maint. Costs				**$1,207,140**
Monthly Passenger Round Trips				**270,150**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$744,985,203	30	$60,035,678
Equipment	$135,749,000	25	$11,648,692
Operation and Maintenance	$5,703,737	N.A.	$5,703,737
Total Annualized Cost			$77,388,107
Total Annual Passengers			1,021,167
Annual Cost/Visitor			**$75.78**

Note – Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning
- Passenger Facility Costs are included in Construction of Stations cost estimate

Source: BRW, Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Dunraven Pass (Between Canyon and Tower) Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	60 Lrg. Bus	$187,500	$11,250,000	$1,800,000	$13,050,000	$0	$13,050,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	60 Buses	$76,000	$4,560,000	$1,413,600	$5,973,600	$1,140,000	$7,113,600
Fuel Storage Tank(s)	14,000 Gal	$2.50	$35,000	$10,850	$45,850	$8,750	$54,600
Tower Parking							
--Auto	558 Spaces	$1,500	$837,000				
--RV	54 Spaces	$3,225	$174,150				
--Bus	3 Spaces	$4,156	$12,468				
Total	615 Spaces		$1,023,618	$317,322	$1,340,940	$255,904	$1,596,844
Canyon Parking							
--Auto	321 Spaces	$1,500	$481,500				
--RV	31 Spaces	$3,225	$99,975				
--Bus	2 Spaces	$4,156	$8,312				
Total	354 Spaces		$589,787	$182,834	$772,621	$147,447	$920,068
Minimum Passenger Facilities							
-- Wood Platform Decking	1,920 S.F.	$10	$19,200	$5,952	$25,152	$4,800	$29,952
-- Timber Shelters w/Decking (Staging Area)	1,920 S.F.	$100	$192,000	$59,520	$251,520	$48,000	$299,520
Total Capital Costs			$17,694,605	$3,794,078	$21,488,683	$1,604,901	$23,093,584

Daily Operation and Maintenance Costs

Daily Vehicle Miles	7,600		$3.50	$26,600
Total Oper. & Maint. Costs				$26,600
Daily Passenger Round Trips				5,800

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	228,000		$3.50	$798,000
Monthly Oper. & Maint. Costs				$798,000
Monthly Passenger Round Trips				174,000

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$10,014,584	30	$807,039
Equipment	$13,079,000	15	$1,436,004
Operation and Maintenance	$3,770,550	N.A.	$3,770,550
Total Annualized Cost			$6,013,593
Total Annual Passengers			657,720
Annual Cost/Visitor			$9.14

Note:
- Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervison and 25% (of net) for planning.

Source: BRW, Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Dunraven Pass (Between Canyon and Tower) Large Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	48 Lrg. Bus	$307,500	$14,760,000	$2,361,600	$17,121,600	$0	$17,121,600
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	48 Buses	$125,400	$6,019,200	$1,865,952	$7,885,152	$1,504,800	$9,389,952
Fuel Storage Tank(s)	16,000 Gal.	$2.50	$40,000	$12,400	$52,400	$10,000	$62,400
Tower Parking							
- Auto	558 Spaces	$1,500	$837,000				
- RV	54 Spaces	$3,225	$174,150				
- Bus	3 Spaces	$4,156	$12,468				
Total	615 Spaces		$1,023,618	$317,322	$1,340,940	$255,905	$1,596,844
Canyon Parking							
- Auto	321 Spaces	$1,500	$481,500				
- RV	31 Spaces	$3,225	$99,975				
- Bus	2 Spaces	$4,156	$8,312				
Total	354 Spaces		$589,787	$182,834	$772,621	$147,447	$920,068
Minimum Passenger Facilities							
- Wood Platform Decking	3,120 S.F.	$10	$31,200	$9,672	$40,872	$7,800	$48,672
- Timber Shelters w/Decking (Staging Area)	3,120 S.F.	$100	$312,000	$96,720	$408,720	$78,000	$486,720
Total Capital Costs			$22,800,805	$4,850,500	$27,651,305	$2,003,951	$29,655,256

Daily Operation and Maintenance Costs

Daily Vehicle Miles	6,080		$3.70	$22,496
Total Oper. & Maint. Costs				$22,496
Daily Passenger Round Trips				5,800

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	182,400		$3.70	$674,880
Monthly Oper. & Maint. Costs				$674,880
Monthly Passenger Round Trips				174,000

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$12,504,656	30	$1,007,708
Equipment	$17,150,600	15	$1,883,044
Operation and Maintenance	$3,188,805	N.A.	$3,188,805
Total Annualized Cost			$6,079,557
Total Annual Passengers			657,720
Annual Cost/Visitor			$9.24

Note: - Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Dunraven Pass (Between Canyon and Tower) Cog Rail Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	20 Trains	$4,750,000	$100,000,000	$10,000,000	$109,000,000	$0	$109,000,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of People - Mover	10 Miles	7,000,000	$140,000,000	$41,200,000	$174,200,000	$33,280,000	$207,480,000
Maintenance Facility	32 Trains	245,000	$7,840,000	$2,080,000	$10,080,000	$1,600,000	$11,680,000
Fuel Storage Tank(s)	58,000 Gal	$2.50	$145,000	$44,000	$189,000	$39,250	$228,000
Tower Parking							
- Auto	558 Spaces	$1,500	$837,000				
- RV	54 Spaces	$3,225	$174,150				
- Bus	3 Spaces	$4,135	$12,405				
Total	615 Spaces		$1,023,518	$317,322	$1,340,940	$250,900	$1,590,844
Canyon Parking							
- Auto	371 Spaces	$1,500	$551,500				
- RV	31 Spaces	$3,225	$99,975				
- Bus	2 Spaces	$4,135	$8,312				
Total	404 Spaces		$589,787	$182,834	$772,621	$147,447	$920,068
Minimum Passenger Facilities							
- Wood Platform Decking	3,120 S.F.	$10	$31,200	$9,672	$40,872	$7,800	$48,672
- Timber Shelter w/Decking (Staging Area)	3,120 S.F.	$100	$312,000	$96,720	$408,720	$78,000	$486,720
Total Capital Costs			**$253,285,360**	**$63,446,266**	**$326,273,903**	**$35,080,431**	**$361,884,304**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	4,000		$12.00	$48,000
Total Oper. & Maint. Costs				**$49,336**
Daily Passenger Round Trips				**5,800**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	120,000		$12.00	$1,440,000
Monthly Oper. & Maint. Costs				**$1,480,080**
Monthly Passenger Round Trips				**174,000**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$252,730,300	30	$17,060,700
Equipment	$109,229,000	25	$11,067,210
Operation and Maintenance	$8,801,020	N.A.	$8,801,020
Total Annualized Cost			$36,768,700
Total Annual Passengers			657,700
Annual Cost/Visitor			**$55.87**

Note:
- Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 10% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 13% (of net) for supervision and 20% (of net) for planning.

Source: BRW Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Canyon Area North Rim Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	14 Conv. Bus	$187,500	$2,625,000	$420,000	$3,045,000	$0	$3,045,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	2,000 S.F	$579	$1,158,000	$358,980	$1,516,980	$289,500	$1,806,480
Fuel Storage Tank(s)	3,000 Gal.	$2.50	$7,500	$2,325	$9,825	$1,875	$11,700
Parking							
--Auto	509 Spaces	$1,500	$763,500				
--RV	50 Spaces	$3,225	$161,250				
--Bus	3 Spaces	$4,156	$12,468				
Total	562 Spaces		$937,218	$290,538	$1,227,756	$234,305	$1,462,061
Minimum Passenger Facilities							
-- Wood Platform Decking	960 S.F	$10	$9,600	$2,976	$12,576	$2,400	$14,976
-- Timber Shelters w/De.Icing (Staging Area)	960 S.F	$100	$96,000	$29,760	$125,760	$24,000	$149,760
Total Capital Costs			$4,858,318	$1,108,579	$5,966,897	$552,080	$6,518,977

Daily Operation and Maintenance Costs

Daily Vehicle Miles	1,560		$3.50	$5,460
Total Oper. & Maint. Costs				$5,460
Daily Passenger Round Trips				9,750

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	46,800		$3.50	$163,800
Monthly Oper. & Maint. Costs				$163,800
Monthly Passenger Round Trips				292,500

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$3,444,977	30	$277,618
Equipment	$3,074,000	15	$337,509
Operation and Maintenance	$773,850	N.A.	$773,850
Total Annualized Cost			$1,388,977
Total Annual Passengers			1,105,650
Annual Cost/Visitor			$1.26

Note: - Reduced Canyon parking requirements by existing surplus supply at Canyon Village Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Canyon Area South Rim Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	11 Conv. Bus	$187,500	$2,062,500	$330,000	$2,392,500	$0	$2,392,500
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	6,000 S.F.	$193	$1,158,000	$358,980	$1,516,980	$289,500	$1,806,480
Fuel Storage Tank(s)	3,000 Gal.	$2.50	$7,500	$2,325	$9,825	$1,875	$11,700
Parking							
– Auto	177 Spaces	$1,500	$265,500				
– RV	18 Spaces	$3,225	$58,050				
– Bus	2 Spaces	$4,156	$8,312				
Total	197 Spaces		$331,862	$102,877	$434,739	$82,966	$517,705
Minimum Passenger Facilities							
– Wood Platform Decking	960 S.F.	$10	$9,600	$2,976	$12,576	$2,400	$14,976
– Timber Shelters w/Decking (Staging Area)	960 S.F.	$100	$96,000	$29,760	$125,760	$24,000	$149,760
Total Capital Costs			**$3,690,462**	**$830,918**	**$4,521,380**	**$400,741**	**$4,922,121**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	1,274		$3.50	$4,459
Total Oper. & Maint. Costs				**$4,459**
Daily Passenger Round Trips				**6,500**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	38,220		$3.50	$133,770
Monthly Oper. & Maint. Costs				**$133,770**
Monthly Passenger Round Trips				**195,000**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$2,500,621	30	$201,516
Equipment	$2,421,500	15	$265,868
Operation and Maintenance	$632,063	N.A.	$632,063
Total Annualized Cost			$1,099,447
Total Annual Passengers			737,100
Annual Cost/Visitor			**$1.49**

Note: – Reduced Canyon parking requirements by existing surplus supply at Upper Falls View, Wapiti Trailhead and Uncle Tom's Trail Lots.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW Inc., 1990

Yellowstone Transit Alternative Cost Estimates

Alternative: Canyon Area South Rim Elevated Monorail Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	4 Trains	$3,900,000	$15,600,000	$2,496,000	$18,096,000	$0	$18,096,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Alignment	1.56 Miles	26,500,000	$41,360,000	$12,795,400	$54,155,400	$10,665,000	$64,820,400
Construction of Stations	3 Stations	1,800,000	$5,400,000	$1,674,000	$7,074,000	$1,080,000	$8,154,000
Maintenance Facility	4 Trains	$300,000	$1,200,000	$372,000	$1,572,000	$240,000	$1,812,000
Parking							
- Auto	183 Spaces	$1,500	$274,500				
- RV	18 Spaces	$3,225	$58,050				
- Bus	2 Spaces	$4,156	$8,312				
Total	203 Spaces		$340,862	$105,667	$446,529	$85,216	$531,745
Total Capital Costs			**$63,925,862**	**$17,447,067**	**$81,372,929**	**$12,070,216**	**$93,443,145**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	287		$11.00	$3,157
Total Oper. & Maint. Costs				**$3,157**
Daily Passenger Round Trips				**6,500**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	8,610		$11.00	$94,710
Monthly Oper. & Maint. Costs				**$94,710**
Monthly Passenger Round Trips				**195,000**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$75,318,145	30	$6,069,618
Equipment	$18,125,000	25	$1,555,316
Operation and Maintenance	$447,505	N.A.	$447,505
Total Annualized Cost			$8,072,439
Total Annual Passengers			737,100
Annual Cost/Visitor			**$10.95**

Note - Reduced Canyon parking requirements by existing surplus supply at Wapiti Trailhead and Uncle Tom's Trail Lots.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 20% (of net) for planning.
- Passenger Facility Costs are included in the Construction of Stations cost estimate.

Source: BRW, Inc., 1993 -

Yellowstone Transit Alternative Cost Estimates

Alternative: Old Faithful/Geyser Basin Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	30 Conv. Bus	$187,500	$5,625,000	$900,000	$6,525,000	$0	$6,525,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	30 Buses	$76,000	$2,280,000	$706,800	$2,986,800	$570,000	$3,556,800
Fuel Storage Tank(s)	10,000 Gal	$2.50	$25,000	$7,750	$32,750	$6,250	$39,000
Parking							
--Auto	669 Spaces	$1,500	$1,003,500				
--RV	65 Spaces	$3,225	$209,625				
--Bus	3 Spaces	$4,156	$12,468				
Total	737 Spaces		$1,225,593	$379,934	$1,605,527	$306,398	$1,911,925
Minimum Passenger Facilities							
-- Wood Platform Decking	960 S.F.	$10	$9,600	$2,976	$12,576	$2,400	$14,976
-- Timber Shelters w/Decking (Staging Area)	960 S.F.	$100	$96,000	$29,760	$125,760	$24,000	$149,760
Total Capital Costs			$9,286,193	$2,031,220	$11,317,413	$909,048	$12,226,461

Daily Operation and Maintenance Costs

Daily Vehicle Miles	5,160		$3.50	$18,060
Total Oper. & Maint. Costs				$18,060
Daily Passenger Round Trips				7,500

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	154,800		$3.50	$541,800
Monthly Oper. & Maint. Costs				$541,800
Monthly Passenger Round Trips				225,000

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$5,672,461	30	$457,123
Equipment	$6,554,000	15	$719,594
Operation and Maintenance	$2,560,005	N.A.	$2,560,005
Total Annualized Cost			$3,736,722
Total Annual Passengers			850,500
Annual Cost/Visitor			$4.39

Note: - Reduced parking requirements by existing surplus supply at Old Faithful West Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW Inc., 1993.

Yellowstone Transit Alternative Cost Estimates

Alternative: Old Faithful/Geyser Basin Articulated Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	25 Art. Bus	$307,500	$7,687,500	$1,230,000	$8,917,500	$0	$8,917,500
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Maintenance Facility	25 Buses	$125,400	$3,135,000	$971,850	$4,106,850	$783,750	$4,890,600
Fuel Storage Tank(s)	11,000 Gal	$2.50	$27,500	$8,525	$36,025	$6,875	$42,900
Parking							
– Auto	669 Spaces	$1,500	$1,003,500				
– RV	65 Spaces	$3,225	$209,625				
– Bus	3 Spaces	$4,156	$12,468				
Total	737 Spaces		$1,225,593	$379,934	$1,605,527	$306,398	$1,911,925
Minimum Passenger Facilities							
– Wood Platform Decking	1,560 S.F.	$10	$15,600	$4,836	$20,436	$3,900	$24,336
– Timber Shelters w/Decking (Staging Area)	1,560 S.F.	$100	$156,000	$48,360	$204,360	$39,000	$243,360
Total Capital Costs			$12,272,193	$2,647,505	$14,919,698	$1,139,923	$16,059,621

Daily Operation and Maintenance Costs

Daily Vehicle Miles	4,300		$3.70	$15,910
Total Oper. & Maint. Costs				$15,910
Daily Passenger Round Trips				7,500

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	129,000		$3.70	$477,300
Monthly Oper. & Maint. Costs				$477,300
Monthly Passenger Round Trips				225,000

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$7,113,121	30	$573,220
Equipment	$8,946,500	15	$982,278
Operation and Maintenance	$2,255,243	N.A.	$2,255,243
Total Annualized Cost			$3,810,741
Total Annual Passengers			850,500
Annual Cost/Visitor			$4.48

Note: – Reduced parking requirements by existing surplus supply at Old Faithful West Lot.
- Items not estimated for cost include visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1993.

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APPENDIX G: Park-wide VTS Alternative Information Summary

Yellowstone Park - wide Transit System Requirements

Route	Private Vehicle Parking Spaces Required	Parking Area Required (acres)	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	Veh. VMT/ Day	Veh. VMT/ Season
West Entrance to East Entrance (via Canyon) Motor Coach Bus	3,411	27.0	171.0	430.0	430.0	2.0	10.0	216	48	46,512	5,585,076
East Entrance to West Entrance (via West Thumb) Motor Coach Bus	3,205	26.0	160.0	460.0	460.0	2.0	10.0	195	50	43,680	5,131,840
North Entrance to Madison Junction (via Norris) Motor Coach Bus	1,780	15.6	60.0	210.0	210.0	4.0	10.0	55	14	12,190	1,723,880
Northeast (Pebble Creek) to North Entrance (via Tower) Motor Coach Bus	1,711	15.0	61.0	221.25	225.00	3.75	10.0	59	13	13,803	1,637,830
South Entrance to Madison Junction (via Old Faithful) Motor Coach Bus	2,900	32.0	118.0	280.5	280.0	2.5	10.0	117	30	28,084	3,880,230
Tower to Canyon (via Dunraven Pass) Cog Rail	NA	NA	36.0	180.0	180.0	8.0	10.0	20	11	4,096	653,280
Total	13,016	144.8	588	1,818	1,830			690	182	148,183	20,758,718

Route	Veh. Fleet Size	Parking Space Net Costs	Parking Space Total Costs	Veh. Fleet Net Costs	Veh. Fleet Total Costs	Alignment Net Costs	Alignment Total Costs		Total Capital Costs	Daily Oper. & Maint. Costs	Seasonal Oper. & Maint. Costs
West Entrance to East Entrance (via Canyon) Motor Coach Bus	230	$5,830,280	$8,788,480	$62,475,000	$72,471,000	NA	NA		$81,280,080	$181,184	$21,427,487
East Entrance to West Entrance (via West Thumb) Motor Coach Bus	216	$5,288,671	$8,281,040	$56,700,000	$65,772,000	NA	NA		$74,053,040	$141,880	$20,183,830
North Entrance to Madison Junction (via Norris) Motor Coach Bus	58	$2,848,480	$4,089,600	$15,487,300	$17,895,000	NA	NA		$22,585,100	$38,527	$5,801,290
Northeast (Pebble Creek) to North Entrance (via Tower) Motor Coach Bus	63	$2,838,230	$4,408,918	$17,082,000	$19,792,000	NA	NA		$24,201,418	$44,093	$6,285,350
South Entrance to Madison Junction (via Old Faithful) Motor Coach Bus	129	$4,793,524	$7,477,687	$33,882,300	$39,291,000	NA	NA		$46,768,687	$84,445	$11,373,504
Tower to Canyon (via Dunraven Pass) Cog Rail	31	$0	$0	$117,250,000	$134,850,000	$85,000,000	$148,250,000		$283,050,000	$61,070	$7,230,450
Total	738	$21,468,177	$33,837,198	$301,837,300	$350,131,800	$85,300,000	$148,250,000		$551,488,858	$512,584	$72,827,337

Annualized						Total
Costs	$2,702,839	$34,933,828	$11,942,800	$49,149,372	$72,827,337	$121,776,088
1992 Peak Season Visitors						2,092,243
Cost Per Visitor						$58.48

Notes: - Bus capacity = [illegible] passengers
- Cog Rail Capacity = 88 passengers
- Costs include parking spaces, cog rail alignment and vehicle fleet only
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning
- Annualized at 7% (15 year bus equipment life, 30 year cog equipment life, 30 year facility life)

APPENDIX H: Final VTS Alternative Information Summaries

West Yellowstone to Grant Village (via Old Faithful) VTS Alternative Definition

Motor Coach Shuttle Bus Transit Alternative

	From Old Faithful	From Grant Village	Total Operations
Route Length (miles)	109.0	109.0	same
Number of Stop Locations	13	13	same
Number of Stops	25	25	same
Travel Speed (mph)	35	35	same
Peak Hourly Capacity	96	96	192
Vehicle Capacity (passengers)	48	48	96
Peak Service Intervals (min.)	30.0	30.0	15.0
Off-Peak Service Intervals (min.)	60.0	60.0	30.0
Travel Time from West Yellowstone to Grant Village (min.)			109.9
Travel Time from West Yellowstone to Old Faithful (min.)	64.4		
Travel Time from Grant Village to Old Faithful (min.)		42.4	
Vehicles Operating During Peak Service	9	9	18
During Off-Peak Service	5	5	10
Fleet Size	10	10	20
Hours of Operation			
Peak (hrs.)			7
Off-Peak (hrs.)			6
Daily Round Trips	20	20	40
Daily Vehicle Hours	93	93	186
Daily Vehicle Miles	2,180	2,180	4,360
Daily Fuel Consumption (gal.)	436	436	872
Maintenance Facility			
– Building Space (s.f.)			2,625
– Vehicle Storage Space (s.f.)			19,341
– Total (s.f.)			21,966
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			46

West Yellowstone to Grant Village (via Old Faithful) VTS Alternative Definition

Motor Coach Shuttle Bus Transit Alternative

Related Facilities and Issues:

West Yellowstone Staging Area

– Day–Use Parking (s.f.) Auto Spaces=182 R.V. Spaces=18	96,800
– Staging Area Passenger Loading/Unloading Facilities (s.f.)	1,920
– Total (s.f.)	98,720
	2.3 Acres

Old Faithful

– Passenger Loading/Unloading Facilities (s.f.)	1,920

Grant Village Staging Area

– Day–Use Parking (s.f.)* Auto Spaces=110 R.V. Spaces=11	58,564
– Staging Area Passenger Loading/Unloading Facilities (s.f.)	1,920
– Total (s.f.)	60,484
	1.4 Acres

Roadway and Parking Issues

- Transit service through this area may help to relieve parking demand, congestion and overflow at sensitive geothermal areas.

* Reduced parking requirements by existing surplus supply at Grant Village Visitor Center Lot (78 Spaces)

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

	From Canyon	From Lake Village	Total Operations
Round Trip Route Length (miles)	34.50	34.50	same
Number of Stop Locations	5	5	same
Number of Stops	9	9	same
Travel Speed (mph)*	18.35	18.35	same
Peak Hourly Passengers	631	631	1,262
Vehicle Capacity (passengers)	44	44	88
Peak Service Intervals (min.)	4.0	4.0	2.0
Off-Peak Service Intervals (min.)	8.0	8.0	4.0
Travel Time from Canyon to Lake Village (min.)	59.4		
Travel Time from Lake Village to Canyon (min.)		59.4	
Vehicles Operating During Peak Service	36	36	72
During Off-Peak Service	18	18	36
Fleet Size	40	40	80
Hours of Operation			
Peak (hrs.)			7
Off-Peak (hrs.)			6
Daily Round Trips	150	150	300
Daily Vehicle Hours	360	360	720
Daily Vehicle Miles	5,175	5,175	10,350
Daily Fuel Consumption (gal.)	1,294	1,294	2,588
Maintenance Facility			
– Building Space (s.f.)			10,500
– Vehicle Storage Space (s.f.)			77,364
– Total (s.f.)			87,864
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			172

*25 mph with ten 3 min. viewing stops = 18.35 mph

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Lake Village Staging Area

– Day–Use Parking (s.f.) Auto Spaces=814 R.V. Spaces=79 Bus Spaces=4	436,633
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	438,553
	10.1 Acres

Canyon Staging Area

– Day–Use Parking (s.f.)* Auto Spaces=509 R.V. Spaces=50 Bus Spaces=3	273,872
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	275,792
	6.3 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon South Rim Drive and intersection with East Entrance Road
- Eliminate private vehicle parking at Mud Volcano/Sulphur Caldron
- Utilize surplus parking supply at Canyon Village for staging area requirements

* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Large Shuttle Bus Transit Alternative

	From Canyon	From Lake Village	Total Operations
Round Trip Route Length (miles)	34.50	34.50	same
Number of Stop Locations	5	5	same
Number of Stops	9	9	same
Travel Speed (mph)*	18.35	18.35	same
Peak Hourly Passengers	631	631	1,262
Vehicle Capacity (passengers)	65	65	130
Peak Service Intervals (min.)	6.0	6.0	3.0
Off–Peak Service Intervals (min.)	12.0	12.0	6.0
Travel Time from Canyon to Lake Village (min.)	59.4		
Travel Time from Lake Village to Canyon (min.)		59.4	
Vehicles Operating During Peak Service	24	24	48
During Off–Peak Service	12	12	24
Fleet Size	27	27	54
Hours of Operation			
Peak (hrs.)			7
Off–Peak (hrs.)			6
Daily Round Trips	100	100	200
Daily Vehicle Hours	240	240	480
Daily Vehicle Miles	3,450	3,450	6,900
Daily Fuel Consumption (gal.)	1,150	1,150	2,300
Maintenance Facility			
– Building Space (s.f.)			11,694
– Vehicle Storage Space (s.f.)			52,002
– Total (s.f.)			63,696
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			116

*25 mph with ten 3 min. viewing stops = 18.35 mph

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Large Shuttle Bus Transit Alternative

Related Facilities and Issues:

Lake Village Staging Area	
– Day–Use Parking (s.f.)	436,633
Auto Spaces=814	
R.V. Spaces=79	
Bus Spaces=4	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	439,753
	10.1 Acres
Canyon Staging Area	
– Day–Use Parking (s.f.)*	273,872
Auto Spaces=509	
R.V. Spaces=50	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	276,992
	6.4 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon South Rim Drive and intersection with East Entrance Road
- Eliminate private vehicle parking at Mud Volcano/Sulphur Caldron
- Utilize surplus parking supply at Canyon Village for staging area requirements

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* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

At-Grade Self-Propelled Rail Transit Alternative

	From Canyon	From Lake Village	Total Operations
Round Trip Route Length (miles)	34.50	34.50	same
Number of Stop Locations	5	5	same
Number of Stops	9	9	same
Travel Speed (mph)	18.35	18.35	same
Peak Hourly Passengers	631	631	1,262
Vehicle Capacity (passengers)	88	88	176
Peak Service Intervals (min.)	7.5	7.5	3.75
Off-Peak Service Intervals (min.)	15.0	15.0	7.5
Travel Time from Lake Village to Canyon (min.)	59.4		
Travel Time from Canyon to Lake Village (min.)		59.4	
Vehicles Operating During Peak Service	20	20	40
During Off-Peak Service	10	10	20
Fleet Size	22	22	44
Hours of Operation			
Peak (hrs.)			7
Off-Peak (hrs.)			6
Daily Round Trips	80	80	160
Daily Vehicle Hours	200	200	400
Daily Vehicle Miles	2,760	2,760	5,520
Daily Fuel Consumption (gal.)	5,520	5,520	11,040
Maintenance Facility			
- Building Space (s.f.)			77,440
- Vehicle Storage Space (s.f.)			44,880
- Total (s.f.)			122,320
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			96

*25 mph with ten 3 min. viewing stops = 18.35 mph

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

At–Grade Self–Propelled Rail Transit Alternative

Related Facilities and Issues:

Lake Village Staging Area

– Day–Use Parking (s.f.)	436,633
Auto Spaces=814	
R.V. Spaces=79	
Bus Spaces=4	
– Staging Area Passenger Loading/Unloading (s.f.)	4,080
– Total (s.f.)	440,713
	10.1 Acres

Canyon Staging Area

– Day–Use Parking (s.f.)*	273,872
Auto Spaces=509	
R.V. Spaces=50	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	4,080
– Total (s.f.)	277,952
	6.4 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon South Rim Drive and intersection with East Entrance Road
- Eliminate private vehicle parking at Mud Volcano/Sulphur Caldron
- Utilize surplus parking supply at Canyon Village for staging area requirements

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* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Elevated Monorail Transit Alternative

	From Canyon	From Lake Village	Total Operations
Round Trip Route Length (miles)	34.50	34.50	same
Number of Stop Locations	5	5	same
Number of Stops	9	9	same
Travel Speed (mph)	18.35	18.35	same
Peak Hourly Passengers	631	631	1,262
Vehicle Capacity (passengers)	147	147	294
Peak Service Intervals (min.)	12.0	12.0	6.00
Off-Peak Service Intervals (min.)	20.0	20.0	10.00
Travel Time from Lake Village to Canyon	59.4		
Travel Time from Canyon to Lake Village		59.4	
Vehicles Operating During Peak Service	12	12	24
During Off-Peak Service	8	8	16
Fleet Size	15	15	30
Hours of Operation			
Peak (hrs.)			7
Off-Peak (hrs.)			6
Daily Round Trips	53	53	106
Daily Vehicle Hours	132	132	264
Daily Vehicle Miles	1,829	1,829	3,658
Daily Fuel Consumption (gal.)	NA	NA	NA
Power Requirements (volts D.C.)	600-750	600-750	same
Maintenance Facility			
- Building Space (s.f.)			52,800
- Vehicle Storage Space (s.f.)			35,844
- Total (s.f.)			88,644
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			68

*25 mph with ten 3 min. viewing stops = 18.35 mph

Hayden Valley (Between Lake Village and Canyon) VTS Alternative Definition

Elevated Monorail Transit Alternative

Related Facilities and Issues:

Lake Village Staging Area

– Day–Use Parking (s.f.)	436,633
Auto Spaces=814	
R.V. Spaces=79	
Bus Spaces=4	
– Staging Area Passenger Loading/Unloading (s.f.)	4,944
– Total (s.f.)	441,577
	10.1 Acres

Canyon Staging Area

– Day–Use Parking (s.f.)*	273,872
Auto Spaces=509	
R.V. Spaces=50	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	4,944
– Total (s.f.)	278,816
	6.4 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon South Rim Drive and intersection with East Entrance Road
- Eliminate private vehicle parking at Mud Volcano/Sulphur Caldron
- Utilize surplus parking supply at Canyon Village for staging area requirements

* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Tower Staging Area	
– Day–Use Parking (s.f.)	299,524
Auto Spaces=558	
R.V. Spaces=54	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	301,444
	6.9 Acres

Canyon Staging Area	
– Day–Use Parking (s.f.)*	172,578
Auto Spaces=321	
R.V. Spaces=31	
Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	174,498
	4.0 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon North Rim Drive and Tower Fall Campground
- Eliminate parking at Tower Fall
- Utilize surplus parking supply at Canyon Village for staging area requirements

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* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

	From Canyon	From Tower	Total Operations
Round Trip Route Length (miles)	38.00	38.00	same
Number of Stop Locations	4	4	same
Number of Stops	7	7	same
Travel Speed (mph)*	18	18	same
Peak Hourly Passengers	406	406	812
Vehicle Capacity (passengers)	44	44	88
Peak Service Intervals (min.)	6.0	6.0	3.0
Off–Peak Service Intervals (min.)	12.0	12.0	6.0
Travel Time from Canyon to Tower (min.)	65.3		
Travel Time from Tower to Canyon (min.)		65.3	
Vehicles Operating During Peak Service	27	27	54
During Off–Peak Service	14	14	28
Fleet Size	30	30	60
Hours of Operation			
Peak (hrs.)			7
Off–Peak (hrs.)			6
Daily Round Trips	100	100	200
Daily Vehicle Hours	273	273	546
Daily Vehicle Miles	3,800	3,800	7,600
Daily Fuel Consumption (gal.)	950	950	1,900
Maintenance Facility			
– Building Space (s.f.)			7,875
– Vehicle Storage Space (s.f.)			58,023
– Total (s.f.)			65,898
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			130

*23.5 mph with ten 3 min. viewing stops = 18 mph

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Large Shuttle Bus Transit Alternative

Related Facilities and Issues:

Tower Staging Area	
– Day–Use Parking (s.f.)	299,524
Auto Spaces=558	
R.V. Spaces=54	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	302,644
	6.9 Acres

Canyon Staging Area	
– Day–Use Parking (s.f.)*	172,578
Auto Spaces=321	
R.V. Spaces=31	
Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	175,698
	4.0 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon North Rim Drive and Tower Fall Campground
- Eliminate parking at Tower Fall
- Utilize surplus parking supply at Canyon Village for staging area requirements

* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Large Shuttle Bus Transit Alternative

	From Canyon	From Tower	Total Operations
Round Trip Route Length (miles)	38.00	38.00	same
Number of Stop Locations	4	4	same
Number of Stops	7	7	same
Travel Speed (mph)*	18	18	same
Peak Hourly Passengers	406	406	812
Vehicle Capacity (passengers)	65	65	130
Peak Service Intervals (min.)	7.5	7.5	3.75
Off-Peak Service Intervals (min.)	15.0	15.0	7.5
Travel Time from Canyon to Tower (min.)	65.3		
Travel Time from Tower to Canyon (min.)		65.3	
Vehicles Operating During Peak Service	21	21	42
During Off-Peak Service	11	11	22
Fleet Size	24	24	48
Hours of Operation			
Peak (hrs.)			7
Off-Peak (hrs.)			6
Daily Round Trips	80	80	160
Daily Vehicle Hours	213	213	426
Daily Vehicle Miles	3,040	3,040	6,080
Daily Fuel Consumption (gal.)	1,013	1,013	2,026
Maintenance Facility			
- Building Space (s.f.)			10,395
- Vehicle Storage Space (s.f.)			53,928
- Total (s.f.)			64,323
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			102

*23.5 mph with ten 3 min. viewing stops = 18 mph

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Cog Rail Transit Alternative

	From Canyon	From Tower	Total Operations
Round Trip Route Length (miles)	38.00	38.00	same
Number of Stop Locations	4	4	same
Number of Stops	7	7	same
Travel Speed (mph)*	18	18	same
Peak Hourly Passengers	406	406	812
Vehicle Capacity (passengers)	88	88	176
Peak Service Intervals (min.)	12.0	12.0	6.0
Off–Peak Service Intervals (min.)	20.0	20.0	10.0
Travel Time from Canyon to Tower (min.)	65.3		
Travel Time from Tower to Canyon (min.)		65.3	
Vehicles Operating During Peak Service	14	14	28
During Off–Peak Service	8	8	16
Fleet Size	16	16	32
Hours of Operation			
Peak (hrs.)			7
Off–Peak (hrs.)			6
Daily Round Trips	53	53	106
Daily Vehicle Hours	146	146	292
Daily Vehicle Miles	2,014	2,014	4,028
Daily Fuel Consumption (gal.)	4,028	4,028	8,056
Maintenance Facility			
– Building Space (s.f.)			56,320
– Vehicle Storage Space (s.f.)			24,960
– Total (s.f.)			81,280
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			82

*23.5 mph with ten 3 min. viewing stops = 18 mph

Dunraven Pass (Between Canyon and Tower) VTS Alternative Definition

Cog Rail Transit Alternative

Related Facilities and Issues:

Tower Staging Area

– Day–Use Parking (s.f.)	299,524
Auto Spaces=558	
R.V. Spaces=54	
Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	302,644
	6.9 Acres

Canyon Staging Area

– Day–Use Parking (s.f.)*	172,578
Auto Spaces=321	
R.V. Spaces=31	
Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	175,698
	4.0 Acres

Roadway and Parking Issues

- Close Grand Loop to private vehicle traffic between Canyon North Rim Drive and Tower Fall Campground
- Eliminate parking at Tower Fall
- Utilize surplus parking supply at Canyon Village for staging area requirements

* Reduced parking requirements by existing surplus supply at Canyon Village Lot (124 Spaces)

Canyon Area VTS Alternatives Definition

North Rim Conventional Shuttle Bus Transit Alternative

	Conventional Bus
Round Trip Route Length (miles)	5.20
Number of Stop Locations	5
Number of Stops	6
Travel Speed (mph)	20
Peak Hourly Passengers	1,365
Vehicle Capacity (passengers)*	50
Peak Service Intervals (min.)	2.0
Off–Peak Service Intervals (min.)	4.0
Travel Time From Canyon Village to Inspiration Point (min.)	5.3
Travel Time From Canyon Village to Brink of Lower Falls (min.)	12.6
Vehicles Operating During Peak Service	12
During Off–Peak Service	6
Fleet Size	14
Hours of Operation	
Peak (hrs.)	7
Off–Peak (hrs.)	6
Daily Round Trips	300
Daily Vehicle Hours	120
Daily Vehicle Miles	1,560
Daily Fuel Consumption (gal.)	390
Maintenance Facility	
– Building Space (s.f.)	2,000
– Vehicle Storage Space (s.f.)	13,539
– Total (s.f.)	15,539
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	31

*Assumes standee passenger space

Canyon Area VTS Alternative Definition

North Rim Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area

– Day–Use Parking (s.f.)*	273,872
Auto Spaces=509	
R.V. Spaces=50	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	275,792
	6.3 Acres

Roadway and Parking Issues

- Close North Rim Drive to private vehicle traffic between camper services facility and intersection with Grand Loop near Lower Falls View
- Eliminate private vehicle parking at Inspiration Point, Grandview Point, Lookout Point and Brink of Lower Falls
- Utilize surplus parking supply at Canyon Village for staging area requirements

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* Reduced parking requirements by existing surplus supply at Canyon Village Lot. (124 Spaces)

Canyon Area VTS Alternatives Definition

South Rim Conventional Shuttle Bus Transit Alternative

	Conventional Bus
Round Trip Route Length (miles)	6.37
Number of Stop Locations	4
Number of Stops	7
Travel Speed (mph)	20
Peak Hourly Passengers	910
Vehicle Capacity (passengers)*	50
Peak Service Intervals (min.)	3.0
Off-Peak Service Intervals (min.)	6.0
Travel Time From Brink of Upper Falls to Artist Point (min.)	11.6
Vehicles Operating During Peak Service	10
During Off-Peak Service	5
Fleet Size	11
Hours of Operation	
Peak (hrs.)	7
Off-Peak (hrs.)	6
Daily Round Trips	200
Daily Vehicle Hours	100
Daily Vehicle Miles	1,274
Daily Fuel Consumption (gal.)	319
Maintenance Facility	
– Building Space (s.f.)	2,000
– Vehicle Storage Space (s.f.)	10,637
– Total (s.f.)	12,637
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	27

*Assumes standee passenger space

Canyon Area VTS Alternative Definition

South Rim Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area

– Day–Use Parking (s.f.)*	96,590
Auto Spaces=177	
R.V. Spaces=18	
Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	98,510
	2.3 Acres

Roadway and Parking Issues

- Close South Rim Drive to private vehicle traffic from Uncle Toms Trail parking to Artist Point
- Eliminate private vehicle parking at Artist Point
- Utilize existing parking supply at Upper Falls View, Wapiti Trailhead and Uncle Tom's Trail for staging area requirements

* Reduced parking requirements by existing parking supply at Upper Falls View, Wapiti Trailhead and Uncle Tom's Trail Lots (260 Spaces)

Canyon Area VTS Alternatives Definition

South Rim Elevated Monorail Transit Alternative

	Monorail
Round Trip Route Length (miles)	3.12
Number of Stop Locations	3
Number of Stops	5
Travel Speed (mph)	20
Peak Hourly Passengers	910
Vehicle Capacity (passengers)	147
Peak Service Intervals (min.)	7.5
Off-Peak Service Intervals (min.)	10.0
Travel Time From Wapiti Trailhead to Artist Point (min.)	9.7
Vehicles Operating During Peak Service	3
During Off-Peak Service	2
Fleet Size	4
Hours of Operation	
Peak (hrs.)	7
Off-Peak (hrs.)	6
Daily Round Trips	92
Daily Vehicle Hours	33
Daily Vehicle Miles	287
Daily Fuel Consumption (gal.)	NA
Power Requirements (Volts D.C.)	600-750
Maintenance Facility	
- Building Space (s.f.)	7,040
- Vehicle Storage Space (s.f.)	4,738
- Total (s.f.)	11,778
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	12

Canyon Area VTS Alternative Definition

South Rim Elevated Monorail Transit Alternative

Related Facilities and Issues:

Staging Area

– Day–Use Parking (s.f.) *	99,494
Auto Spaces=163 R.V. Spaces=18 Bus Spaces=2	
– Staging Area Passenger Loading/Unloading (s.f.)	4,944
– Total (s.f.)	104,438
	2.4 Acres

Roadway and Parking Issues

- Close South Rim Drive to private vehicle traffic from Uncle Toms Trail parking to Artist Point
- Eliminate private vehicle parking at Artist Point
- Utilize existing parking supply at Wapiti Trailhead and Uncle Tom's Trail for staging area requirements

* Reduced parking requirements by existing parking supply at Wapiti Trailhead and Uncle Tom's Trail Lots (178 Spaces)

Old Faithful/Geyser Basin VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

	Conventional Bus
Round Trip Route Length (miles)	21.50
Number of Stop Locations	7
Number of Stops	11
Travel Speed (mph)	25
Peak Hourly Passengers	1,050
Vehicle Capacity (passengers)	44
Peak Service Intervals (min.)	2.5
Off–Peak Service Intervals (min.)	5.0
Travel Time From Old Faithful to Fountain Paint Pots (min.)	34.6
Vehicles Operating During Peak Service	27
During Off–Peak Service	13
Fleet Size	30
Hours of Operation	
Peak (hrs.)	7
Off–Peak (hrs.)	6
Daily Round Trips	240
Daily Vehicle Hours	267
Daily Vehicle Miles	5,160
Daily Fuel Consumption (gal.)	1,290
Maintenance Facility	
– Building Space (s.f.)	3,938
– Vehicle Storage Space (s.f.)	29,012
– Total (s.f.)	32,950
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	65

Old Faithful/Geyser Basin VTS Alternative Definition

Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area

– Day–Use Parking (s.f.)*	358,572
Auto Spaces=669 R.V. Spaces=65 Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	1,920
– Total (s.f.)	360,492
	8.3 Acres

Roadway and Parking Issues

- Close portion of existing Grand Loop alignment to private vehicular traffic north of Midway Geyser Basin if roadway relocated.
- Close Firehole Lake Drive to private vehicular traffic
- Eliminate private vehicle parking at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, Great Fountain Geyser/White Dome Geyser, Firehole Lake and Fountain Paint Pot Trail (sensitive geothermal features)
- Utilize surplus parking supply at Old Faithful for staging area requirements

* Reduced parking requirements by existing surplus supply at West Lot (141 Spaces)

Old Faithful/Geyser Basin VTS Alternative Definition

Articulated Shuttle Bus Transit Alternative

	Articulated Bus
Round Trip Route Length (miles)	21.50
Number of Stop Locations	7
Number of Stops	11
Travel Speed (mph)	25
Peak Hourly Passengers	1,050
Vehicle Capacity (passengers)	65
Peak Service Intervals (min.)	3.0
Off–Peak Service Intervals (min.)	6.0
Travel Time From Old Faithful to Fountain Paint Pots (min.)	34.6
Vehicles Operating During Peak Service	22
During Off–Peak Service	11
Fleet Size	25
Hours of Operation	
Peak (hrs.)	7
Off–Peak (hrs.)	6
Daily Round Trips	200
Daily Vehicle Hours	220
Daily Vehicle Miles	4,300
Daily Fuel Consumption (gal.)	1,433
Maintenance Facility	
– Building Space (s.f.)	5,414
– Vehicle Storage Space (s.f.)	28,067
– Total (s.f.)	33,481
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	54

Old Faithful/Geyser Basin VTS Alternative Definition

Articulated Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area	
– Day–Use Parking (s.f.)*	358,572
Auto Spaces=669	
R.V. Spaces=65	
Bus Spaces=3	
– Staging Area Passenger Loading/Unloading (s.f.)	3,120
– Total (s.f.)	361,692
	8.3 Acres

Roadway and Parking Issues

- Close portion of existing Grand Loop alignment to private vehicular traffic north of Midway Geyser Basin if roadway relocated
- Close Firehole Lake Drive to private vehicular traffic.
- Eliminate private vehicle parking at Black Sand Basin, Biscuit Basin, Midway Geyser Basin, Great Fountain Geyser/White Dome Geyser, Firehole Lake and Fountain Paint Pot Trail (sensitive geothermal features)
- Utilize surplus parking supply at Old Faithful for staging area requirements

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* Reduced parking requirements by existing surplus supply at West Lot (141 Spaces)

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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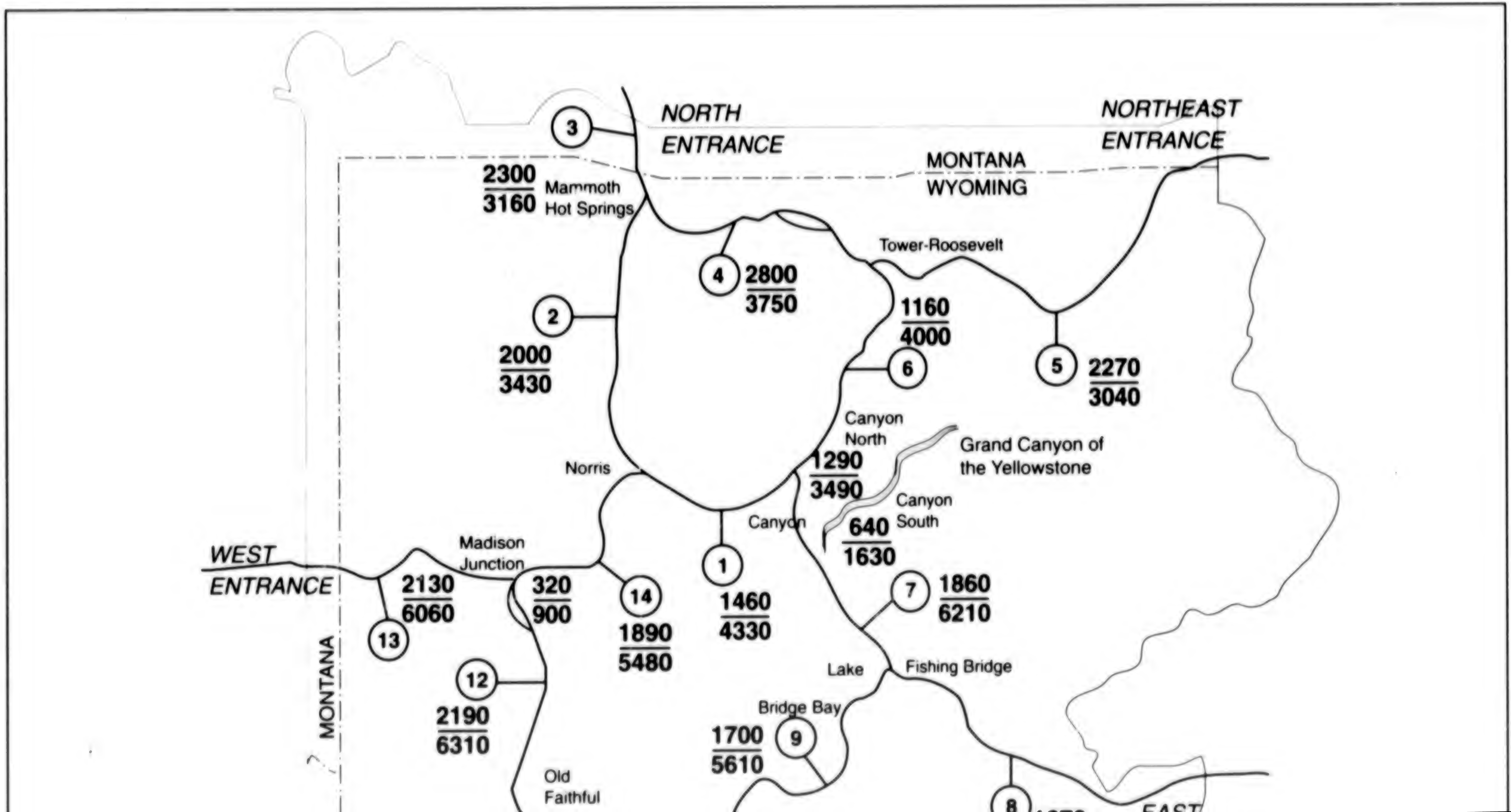
YEAR 1992 AVERAGE



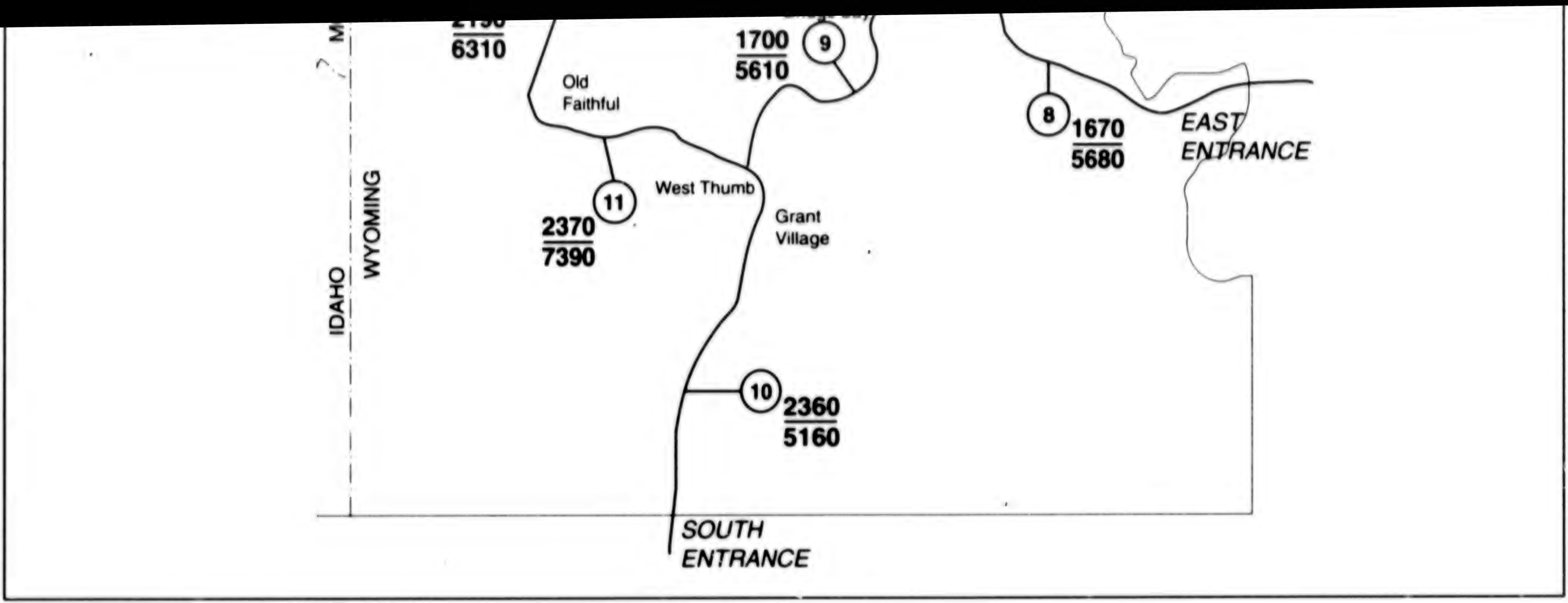
YEAR 1992 AVERAGE DAILY TRAFFIC

LEGEND

1670 ANNUAL ADT

5680 PEAK SEASON ADT (SUMMER)

— MAJOR PARK ROADS



1670	ANNUAL ADT
5680	PEAK SEASON ADT (SUMMER)
———	MAJOR PARK ROADS

Source National Park Service Traffic Count Program, 1992

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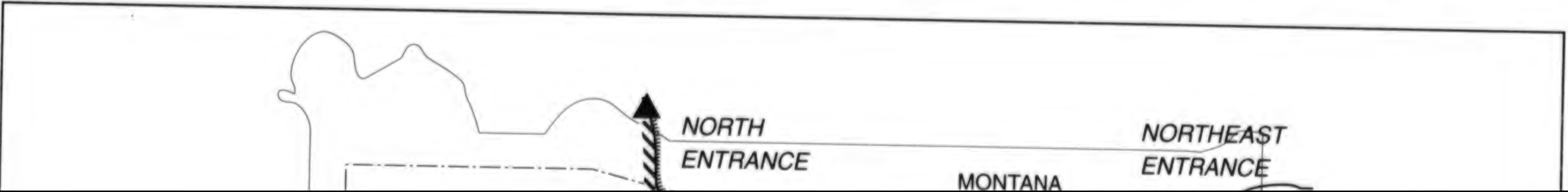
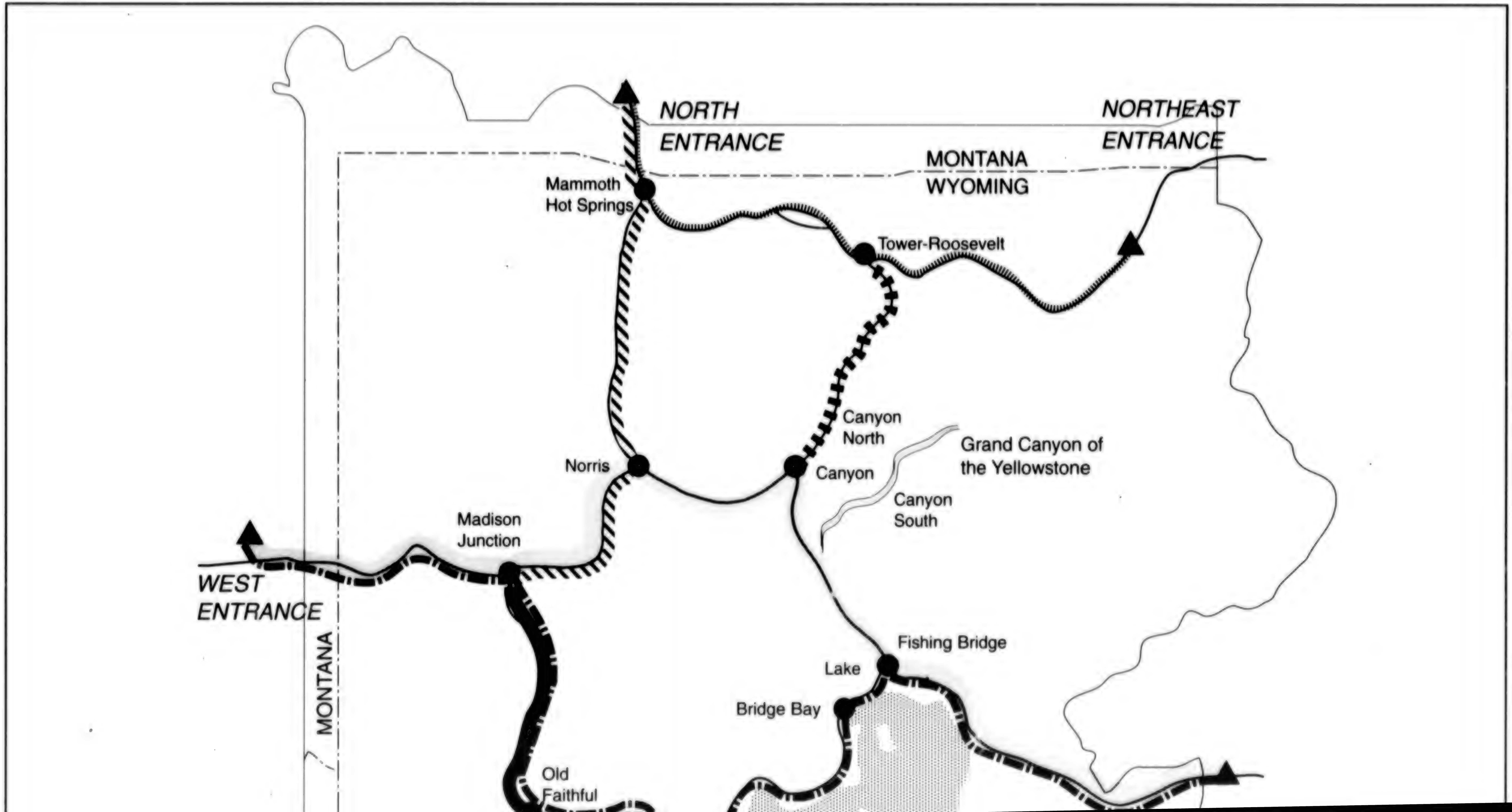


PARKWIDE VTS ALTERNATIVE

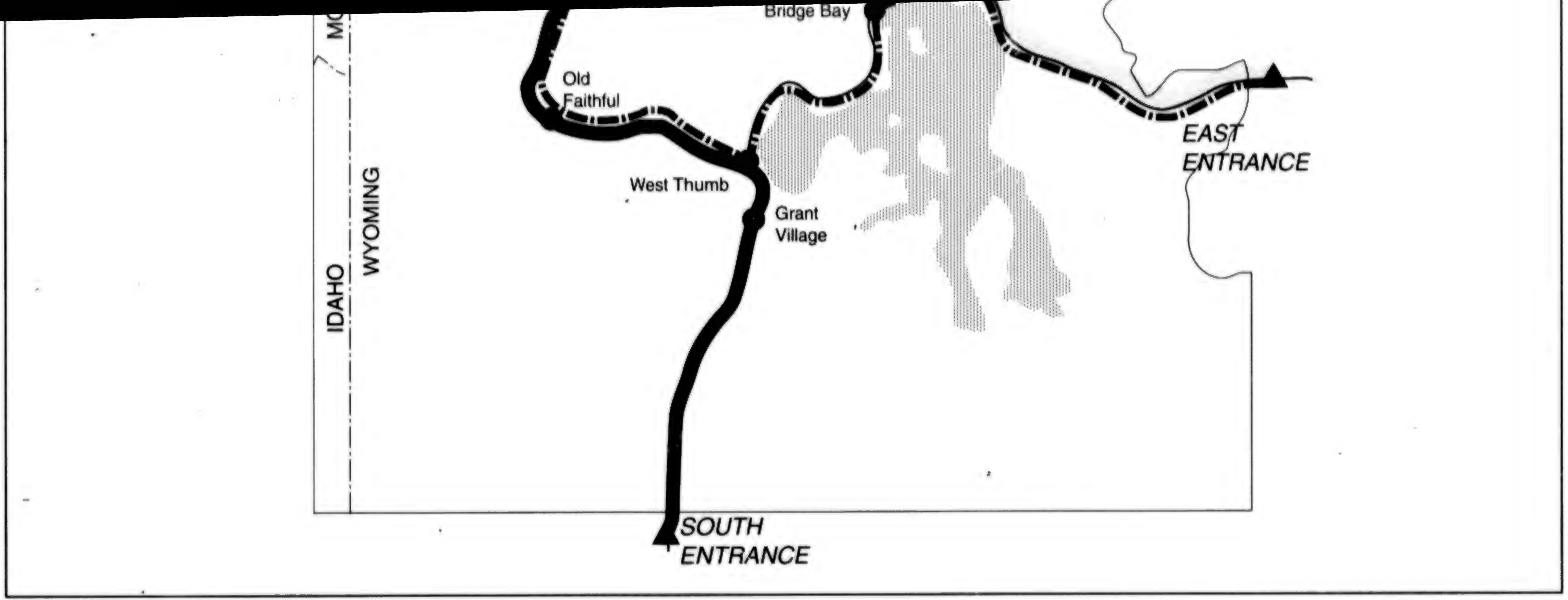


PARKWIDE VTS ALTERNATIVE

LEGEND

TRANSIT SERVICE BETWEEN:

- |||||||||| NORTHEAST AND NORTH ENTRANCES (via Tower)
- \\\\\\ NORTH ENTRANCE AND MADISON JUNCTION (via Norris)
- ░ WEST AND EAST ENTRANCES (via Canyon)
- ▬·▬ EAST AND WEST ENTRANCES (via West Thumb)
- ▬ SOUTH ENTRANCE AND MADISON JUNCTION (via Old Faithful)
- ▮▮▮▮ TOWER-ROOSEVELT TO CANYON (via Dunraven Pass)
- — MAJOR ROADS



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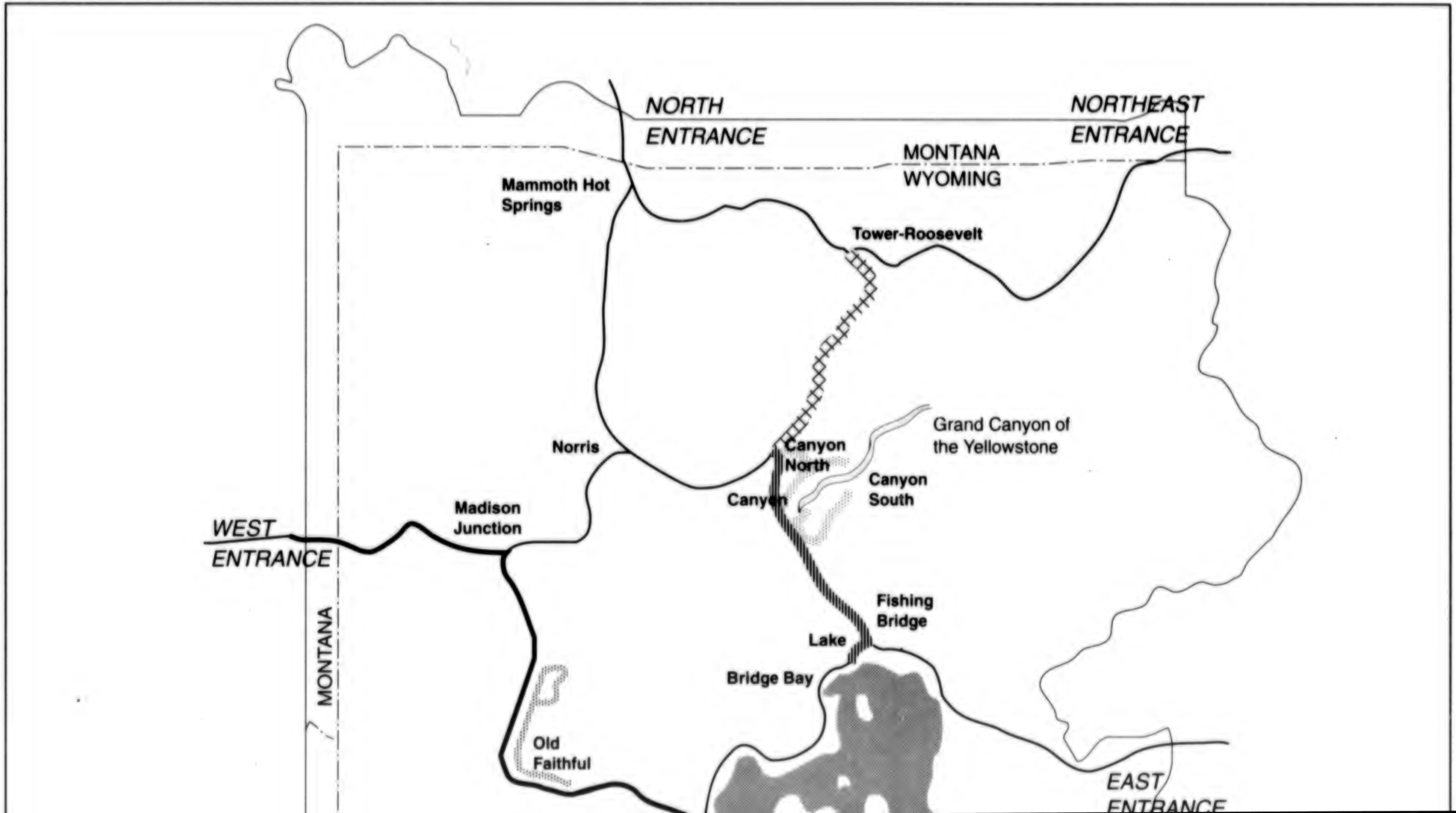
CANDIDATE AREAS FOR TRANSIT



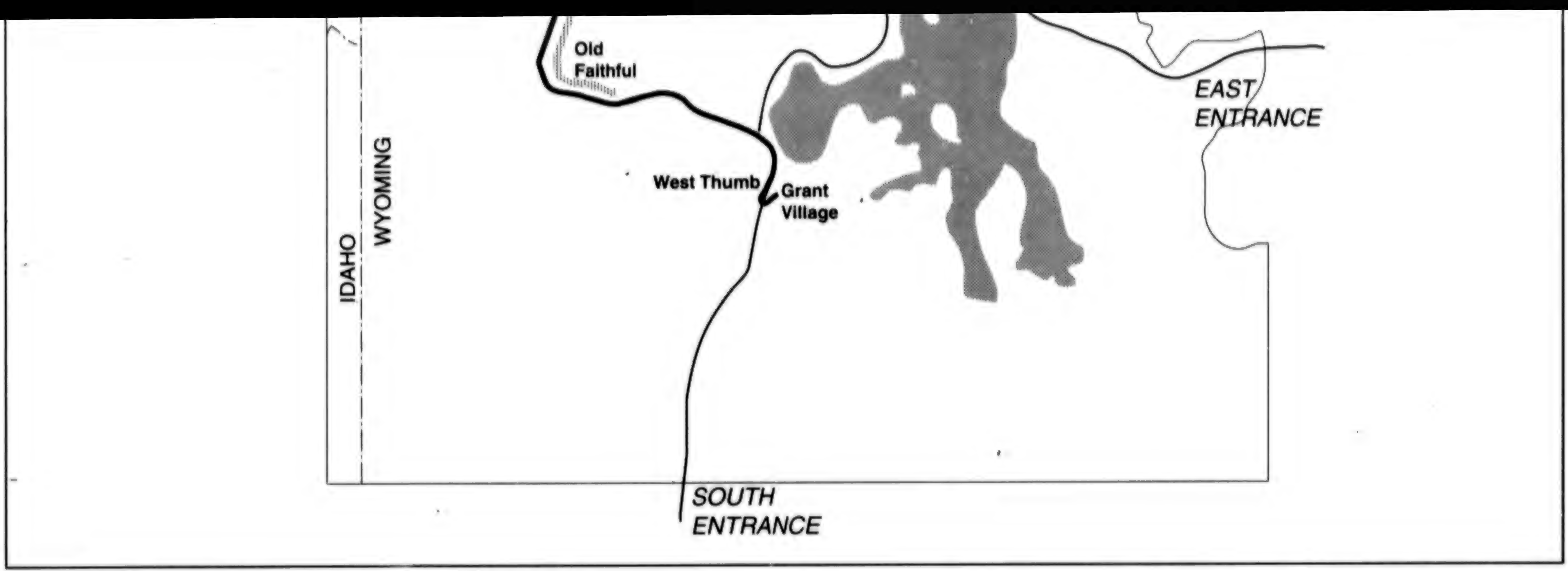
CANDIDATE AREAS FOR TRANSIT SERVICE

LEGEND

— WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful) SEGMENT

░ OLD FAITHFUL AREA

▥ HAYDEN VALLEY SEGMENT



VILLAGE (via Old Faithful) SEGMENT

▨ OLD FAITHFUL AREA

▨ HAYDEN VALLEY SEGMENT

▨ CANYON AREA

XXXXX CANYON TO TOWER SEGMENT

N

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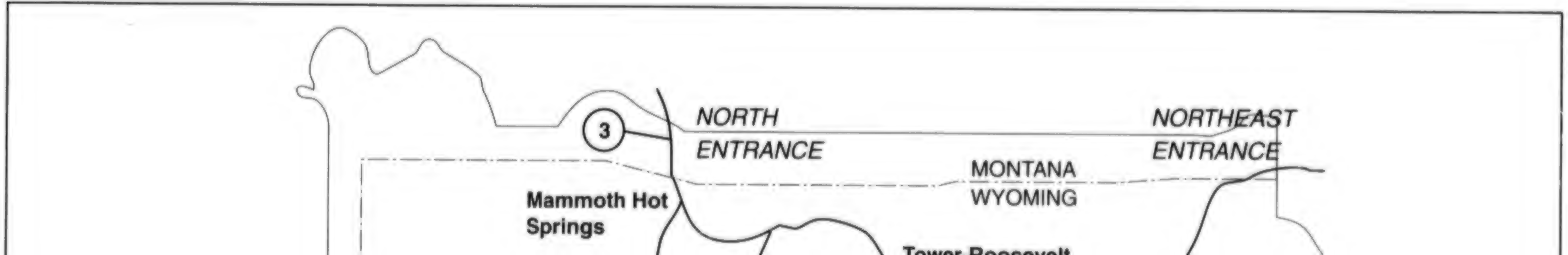
ROAD SEGMENTS



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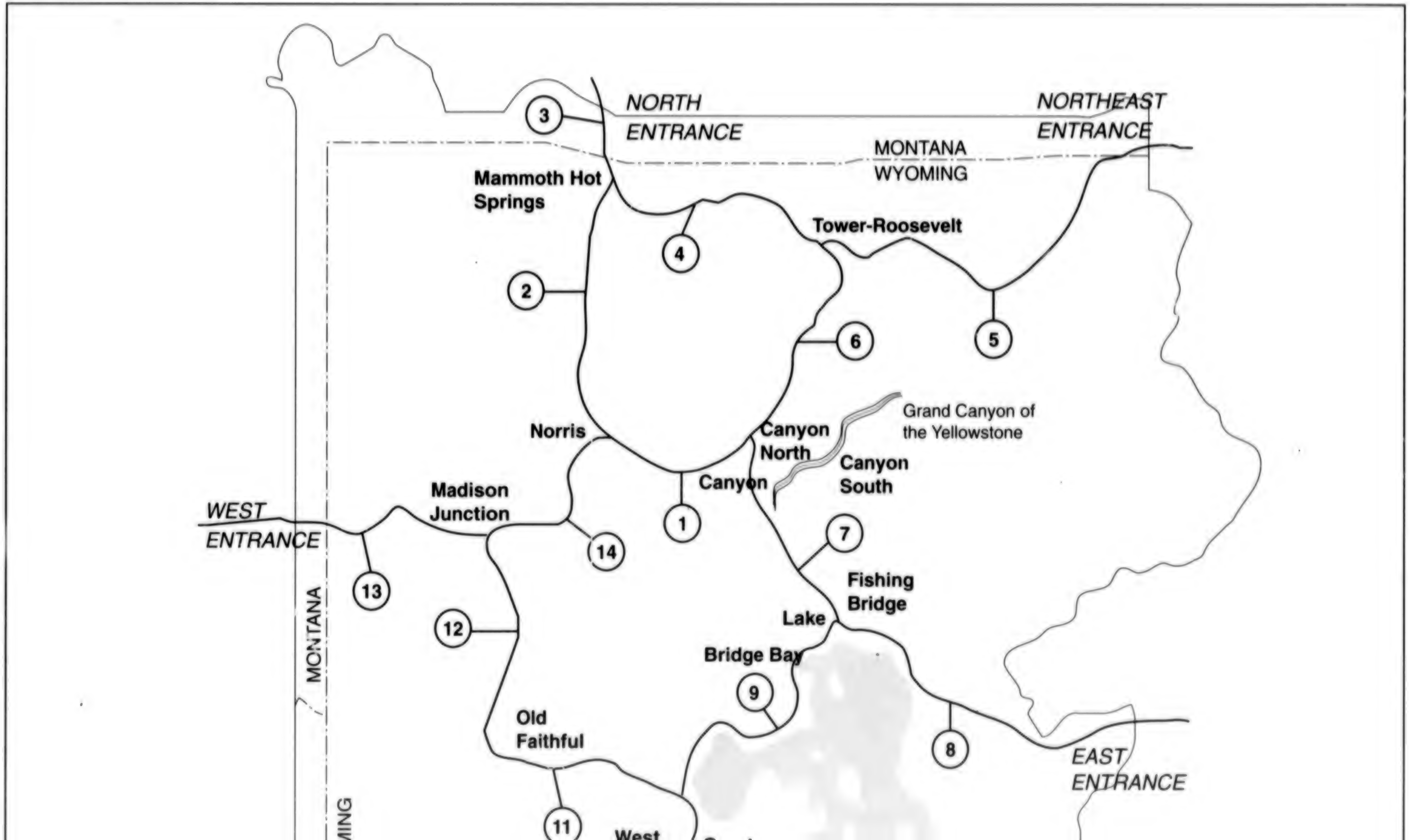
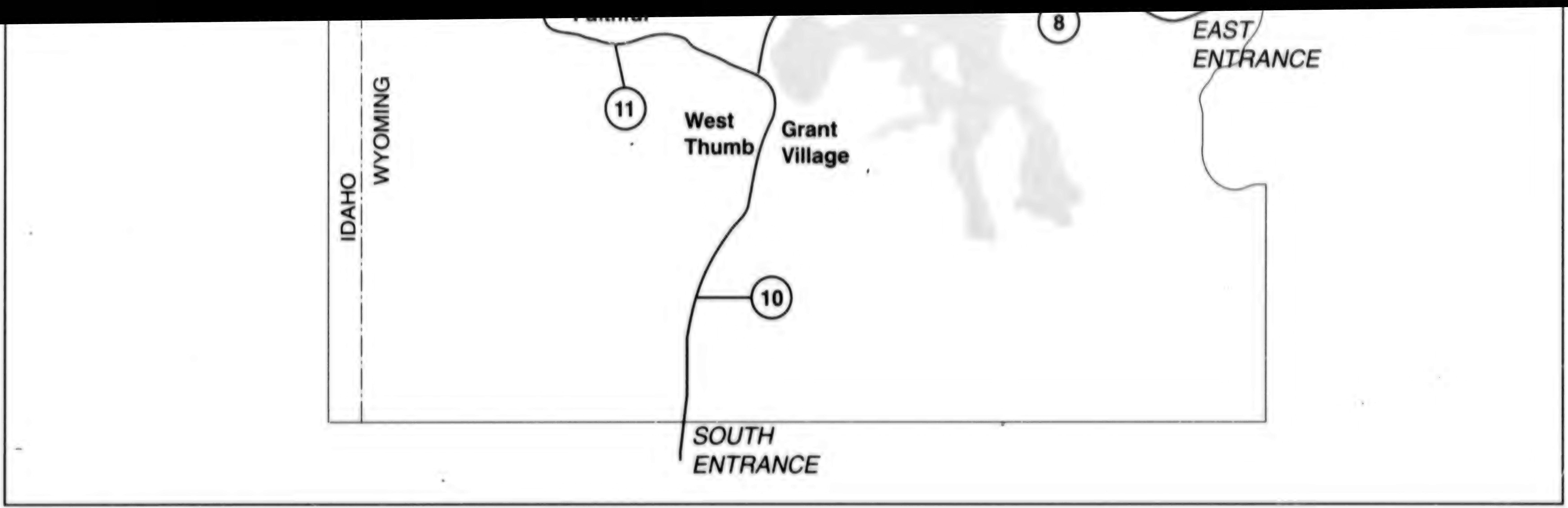


LEGEND

Norris LOCATION NAME

① ROADWAY SEGMENT NUMBER

NOTE: Numbered segments referenced in this report



① ROADWAY SEGMENT NUMBER

NOTE: Numbered segments referenced in this report

Source: Traffic Engineering Safety Improvement Study, 1986.

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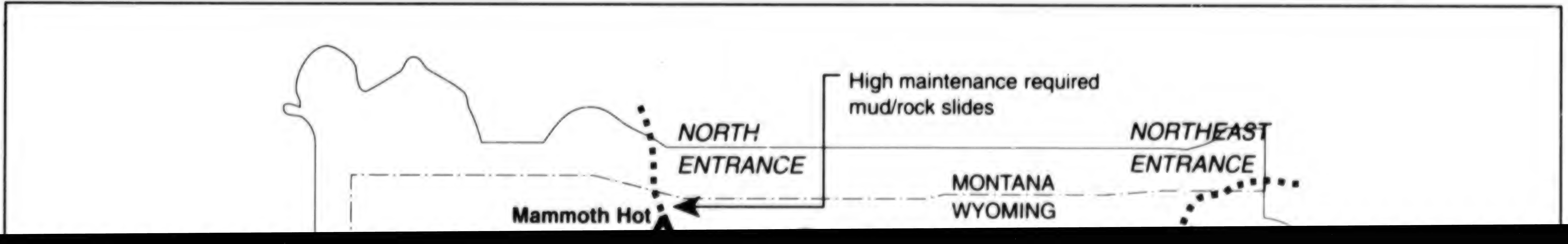
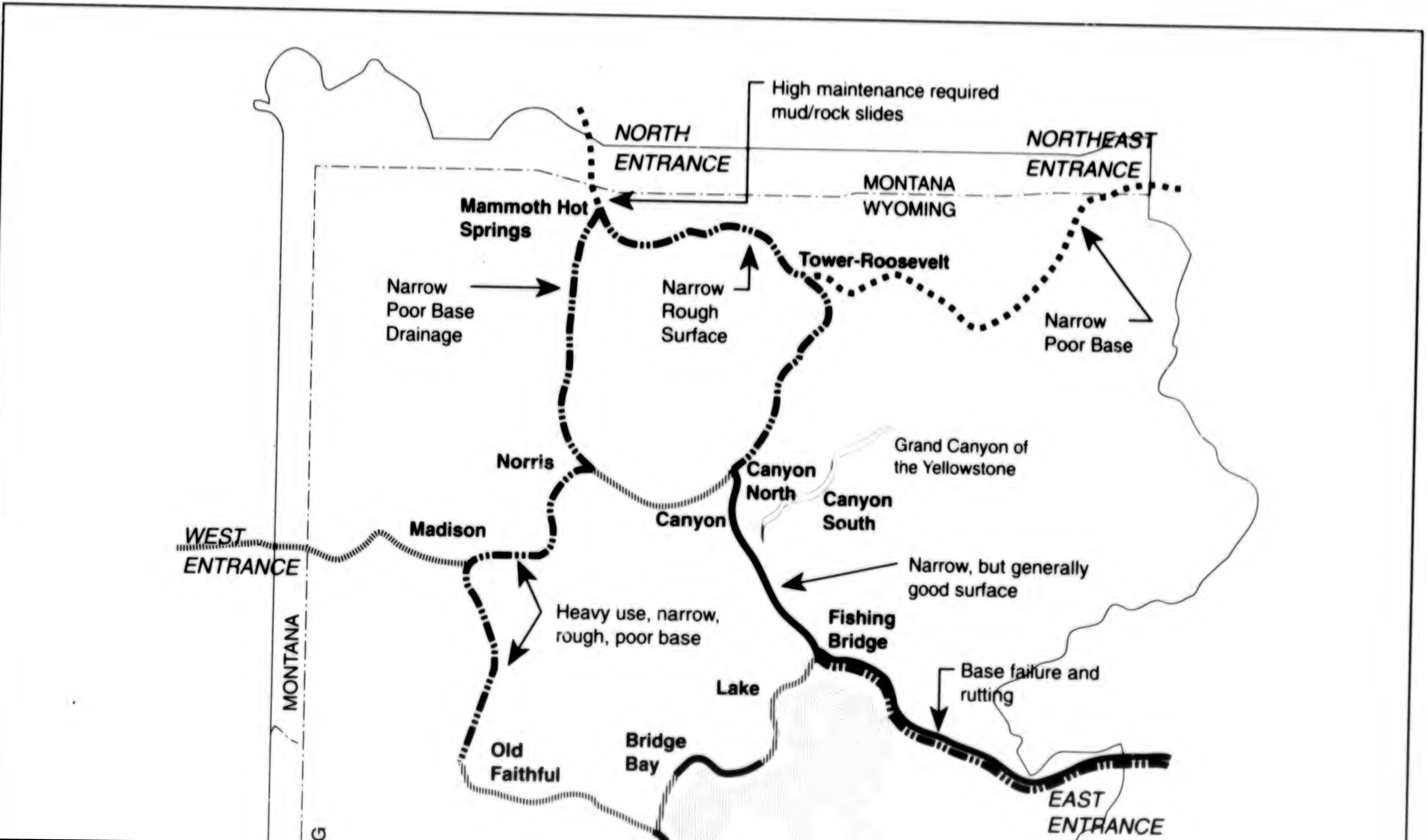
ROADWAY CONDITIONS



ROADWAY CONDITIONS



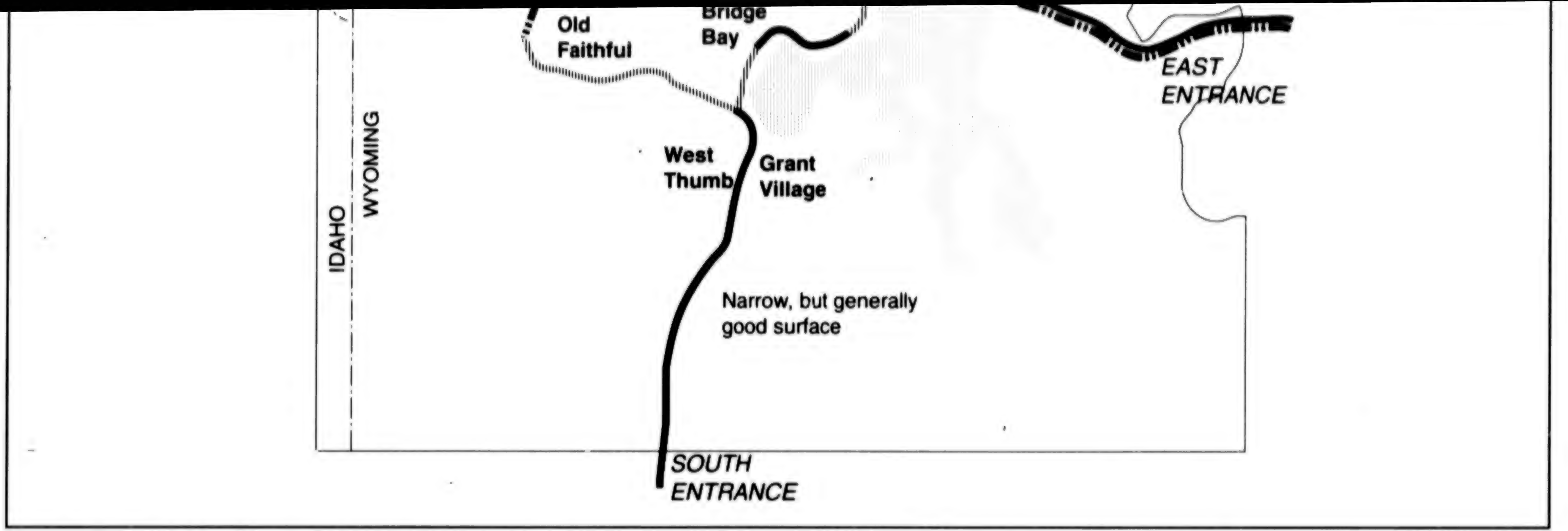
LEGEND

━ ONGOING IMPROVEMENTS

ROAD CONDITION

━ GOOD

▨ GOOD WITH 30' STANDARD



Source BRW, Inc., July, 1992

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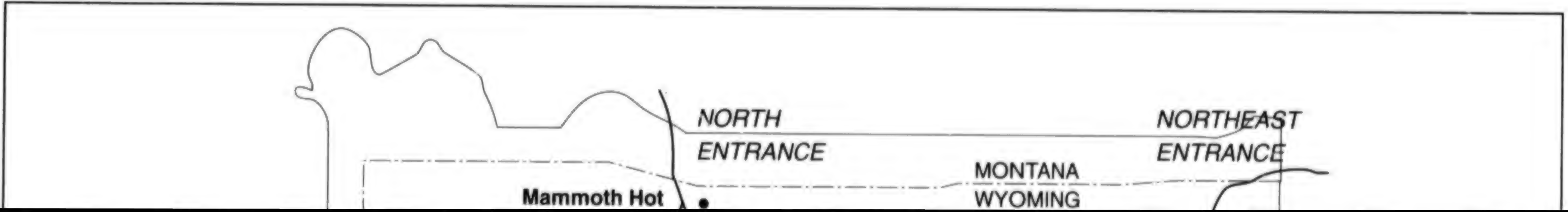
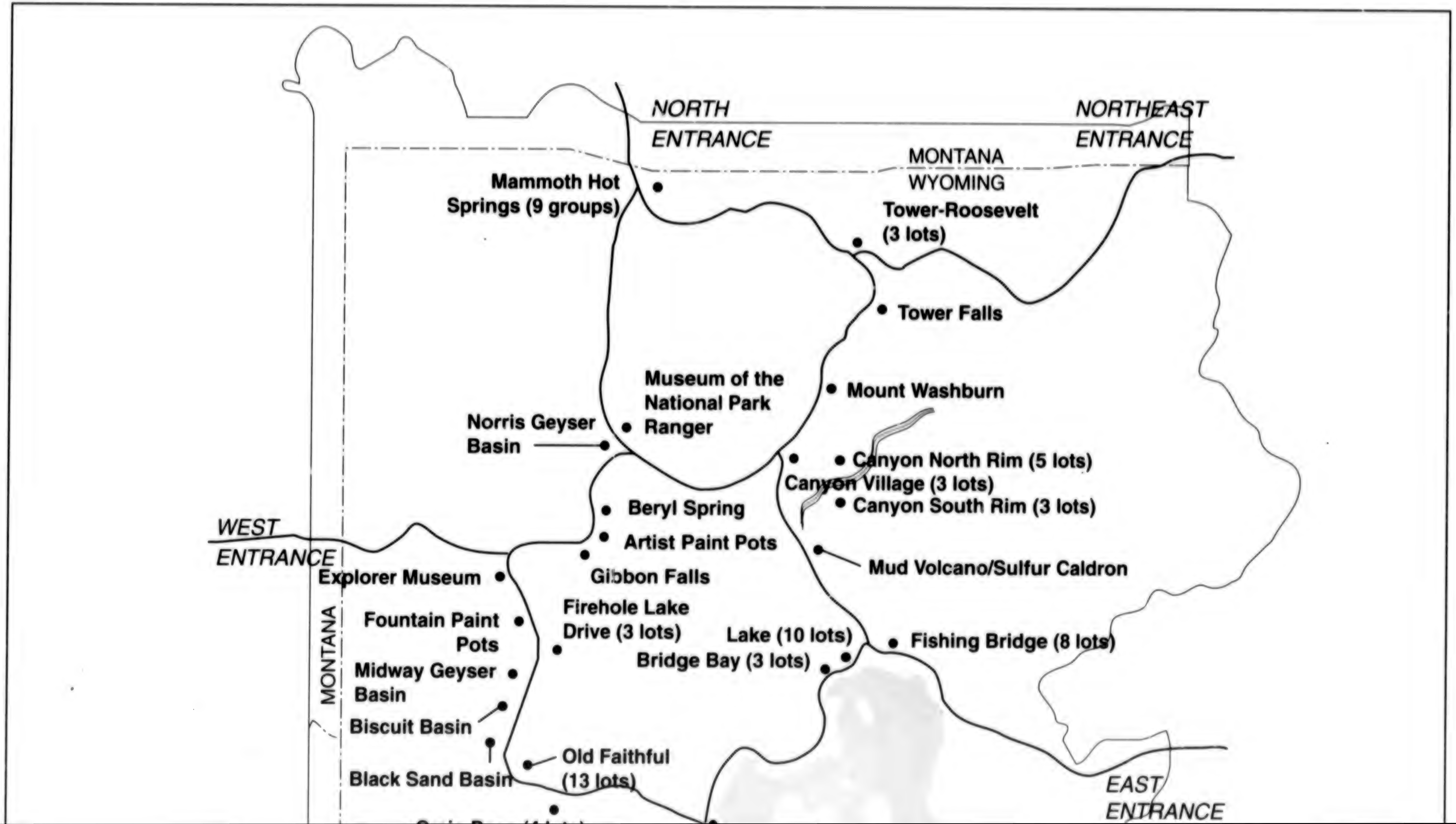


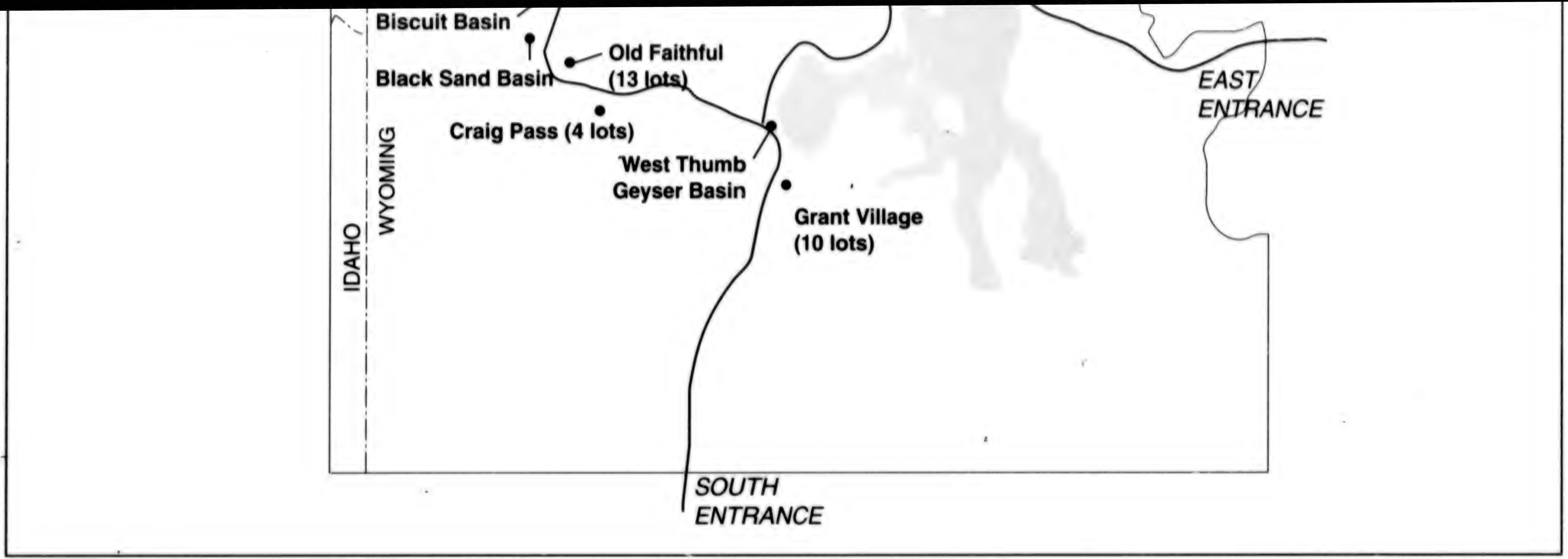
PARKING LOT LOCATIONS

PARKING LOT LOCATIONS



LEGEND

- ● PARKING LOTS LOCATED AT DEVELOPED AREAS AND MAJOR



LEGEND

- ● PARKING LOTS LOCATED AT DEVELOPED AREAS AND MAJOR ATTRACTIONS

NOTE: Informal or unimproved lots are not included

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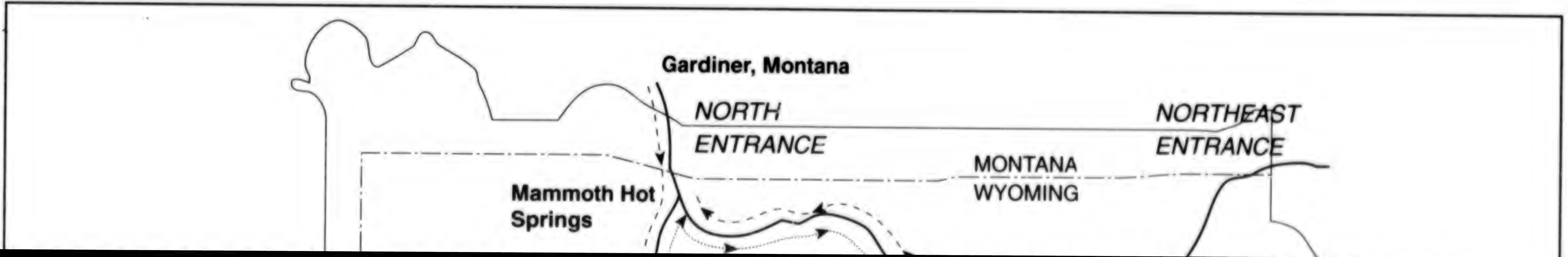
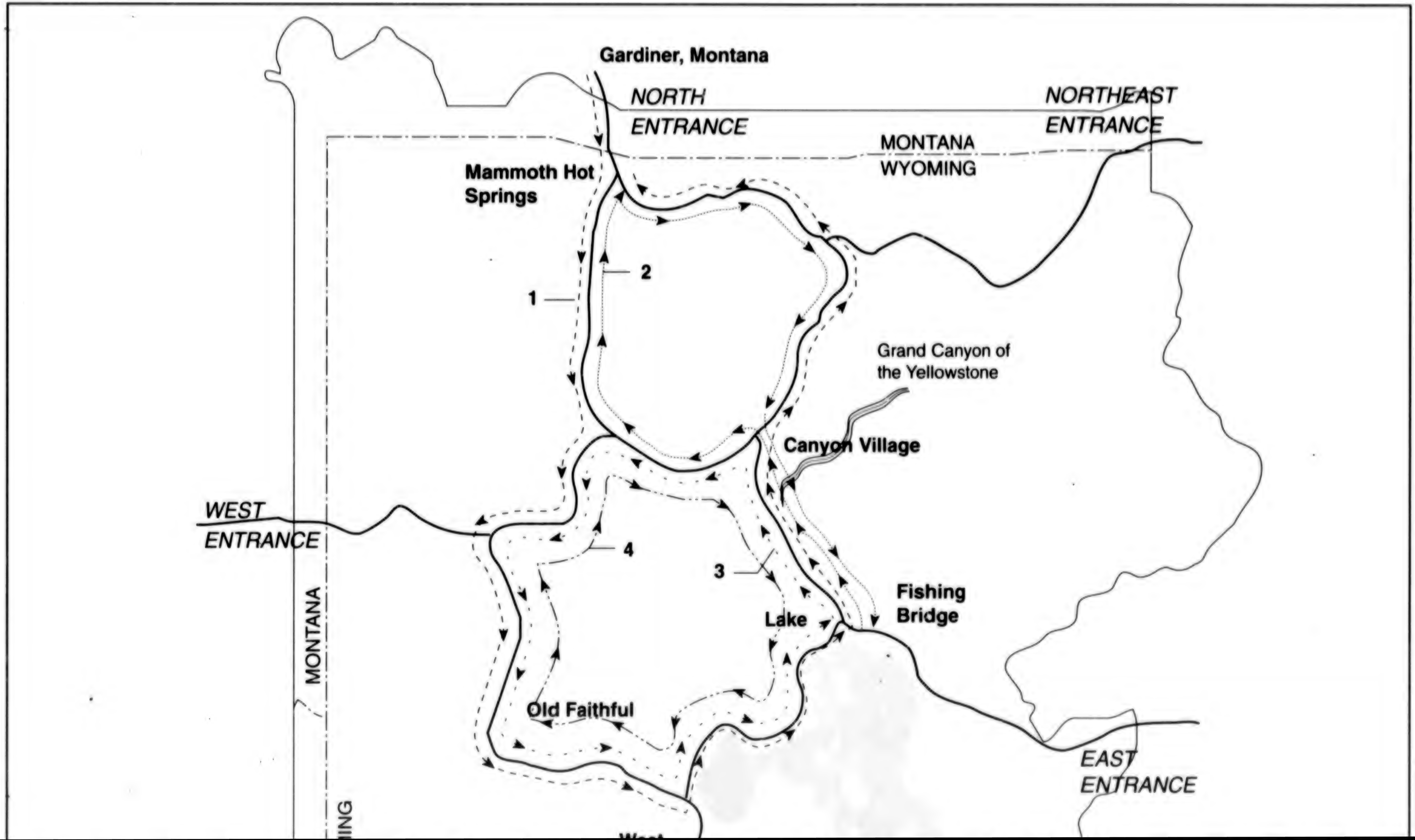


BUS TOURS OFFERED BY TW RECREATIONAL SERVICES



BUS TOURS OFFERED BY TW RECREATIONAL SERVICES

LEGEND

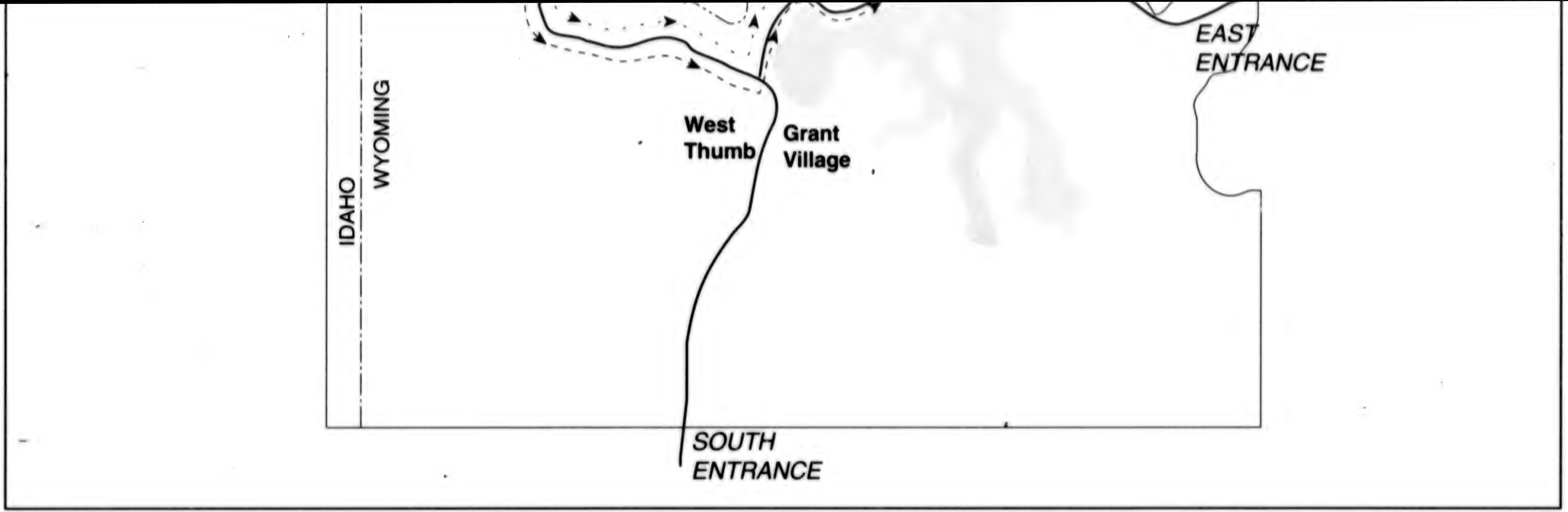
- - - - 1 **GRAND LOOP TOUR**
Origin: Gardiner, Montana
Pickup: Mammoth Hot Springs
Return: Mammoth Hot Springs

.... 2 **UPPER LOOP TOUR**
Origin: Lake
Pickup: Fishing Bridge RV Park
Pickup: Canyon Village
Return: Canyon Village
Return: Fishing Bridge RV Park

· · · 3 **OLD FAITHFUL AND GRANT VILLAGE LOWER LOOP TOUR**
Origin: Old Faithful
Pickup: Grant Village
Return: Grant Village
Return: Old Faithful

—·-· 4 **CANYON VILLAGE, FISHING BRIDGE AND LAKE LOWER LOOP TOUR**
Origin: Canyon Village
Pickup: Fishing Bridge RV Park
Pickup: Lake
Return: Fishing Bridge RV Park
Return: Lake

Source: TW Recreational Services; October, 1992



Pickup: Fishing Bridge RV Park
Pickup: Lake
Return: Fishing Bridge RV Park
Return: Lake

Source: TW Recreational Services; October, 1992

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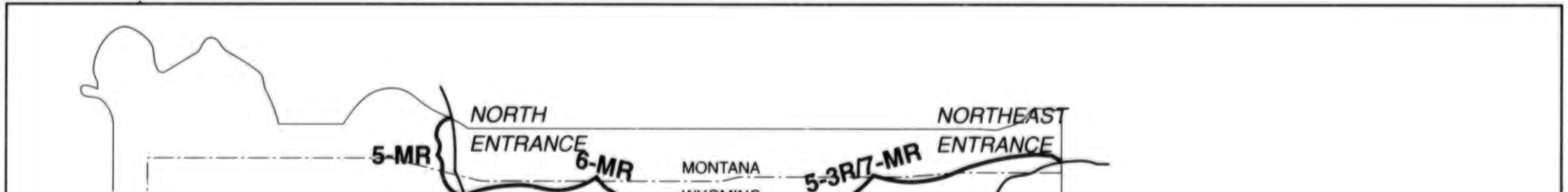
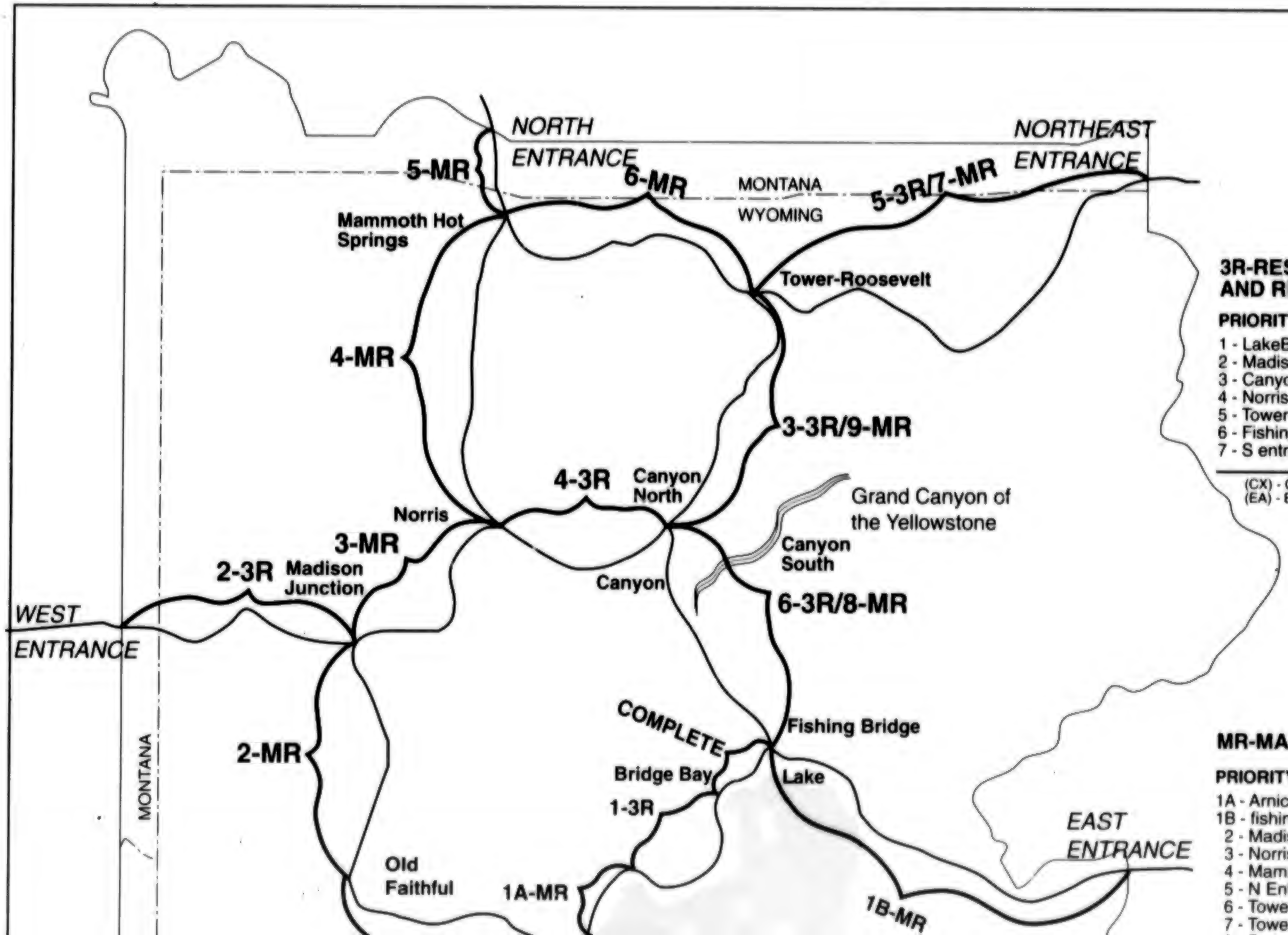
ROAD IMPROVEMENT PROGRAM



ROAD IMPROVEMENT PROGRAM



3R-RESURFACING, RESTORATION, AND REHABILITATION

PRIORITY	MILES
1 - LakeBypass S to Arnica Creek (CX)	3.28
2 - Madison to W Entrance (CX)	13.86
3 - Canyon Village to Tower-Roosevelt (EA)	18.23
4 - Norris to Canyon Village (CX)	11.57
5 - Tower-Roosevelt to NE Entrance (EA)	29.15
6 - Fishing Bridge to Canyon Village (EA)	14.99
7 - S entrance to Grant Village (CX)	21.45

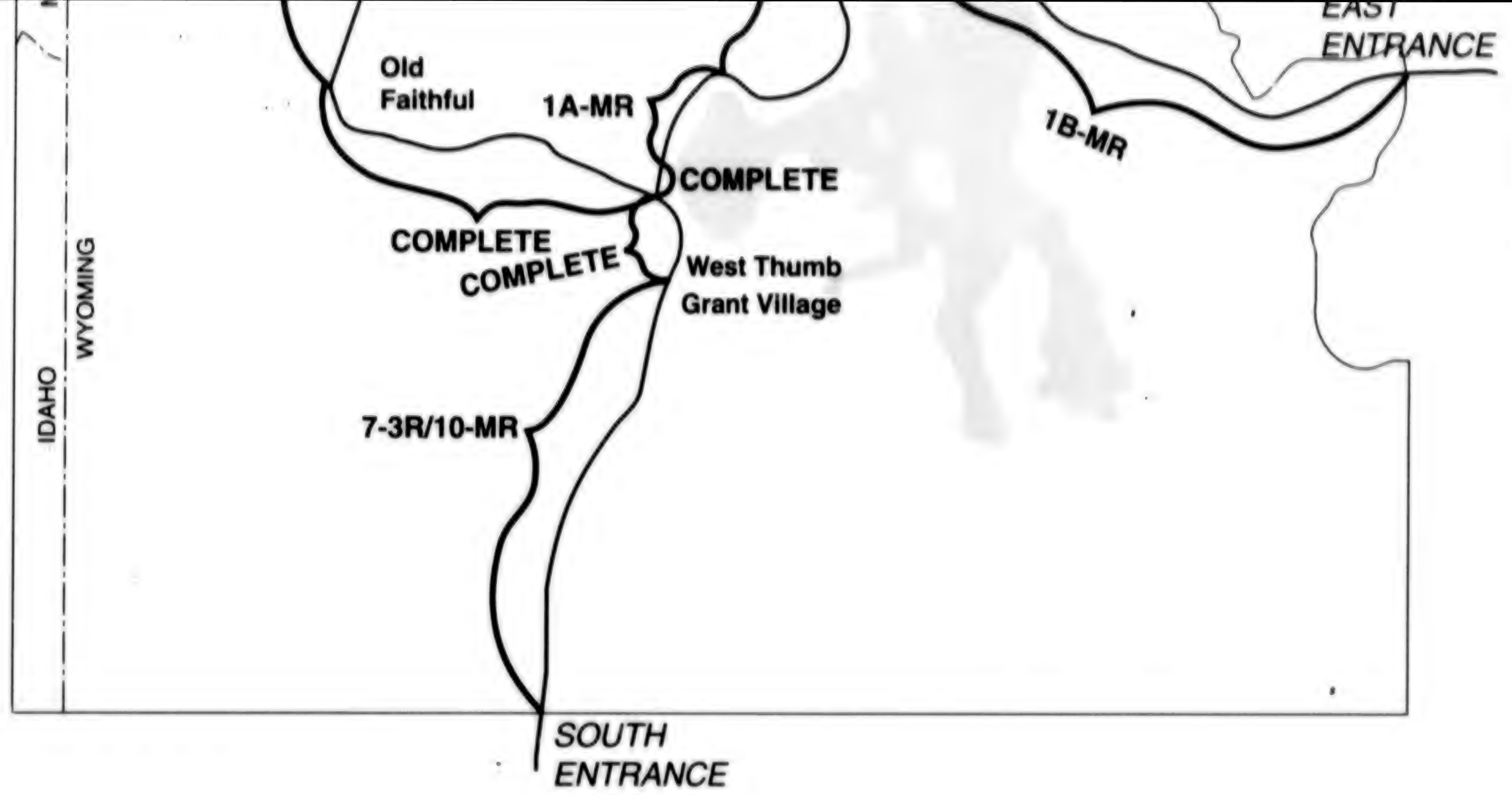
(CX) - Categorical Exclusion
(EA) - Environmental Assessment will be prepared

MR-MAJOR RECONSTRUCTION

PRIORITY	MILES
1A - Arnica Creek to W Thumb (EA)	3.20
1B - fishing Bridge to E Entrance (EA)	26.02
2 - Madison to Biscuit Basin (EA)	13.81
3 - Norris to Madison (EA)	13.88
4 - Mammoth to Hot Springs to Norris (EA)	20.24
5 - N Entrance to Mammoth Hot Springs (EA)(EIS)	5.23
6 - Tower-Roosevelt to Mammoth Hot Springs (EA)	18.20
7 - Tower-Roosevelt to NE Entrance (EA)	29.15

LEGEND

Norris	LOCATION NAME
1B-MR	PRIORITY RANKING FOR MAJOR RECONSTRUCTION
1-3R	PRIORITY RANKING FOR



1B - Fishing Bridge to E Entrance (EA)	26.02
2 - Madison to Biscuit Basin (EA)	13.81
3 - Norris to Madison (EA)	13.88
4 - Mammoth to Hot Springs to Norris (EA)	20.24
5 - N Entrance to Mammoth Hot Springs (EA)(EIS)	5.23
6 - Tower-Roosevelt to Mammoth Hot Springs (EA)	18.20
7 - Tower-Roosevelt to NE Entrance (EA)	29.15
8 - Fishing Bridge to Canyon Village (EA)	14.99
9 - Canyon Village to Tower-Roosevelt (EA)	18.23
10 - S Entrance to Grant Village (EA)	21.45

(CX) - Categorical Exclusion
(EA) - Environmental Assessment will be prepared
(EIS) - Environmental Impact Statement may be required if road realignment is considered

1B-MR PRIORITY RANKING FOR MAJOR RECONSTRUCTION

1-3R PRIORITY RANKING FOR RESURFACING, RESTORATION, AND REHABILITATION

Source: Parkwide Road Improvement Plan 1992

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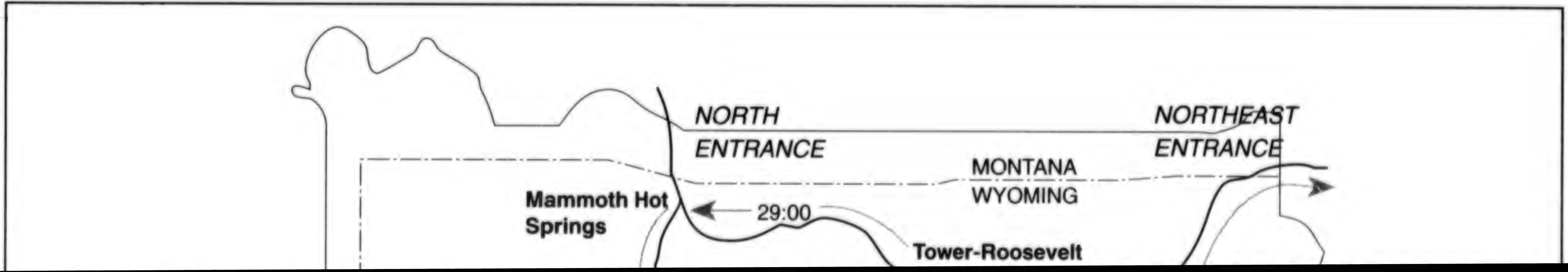
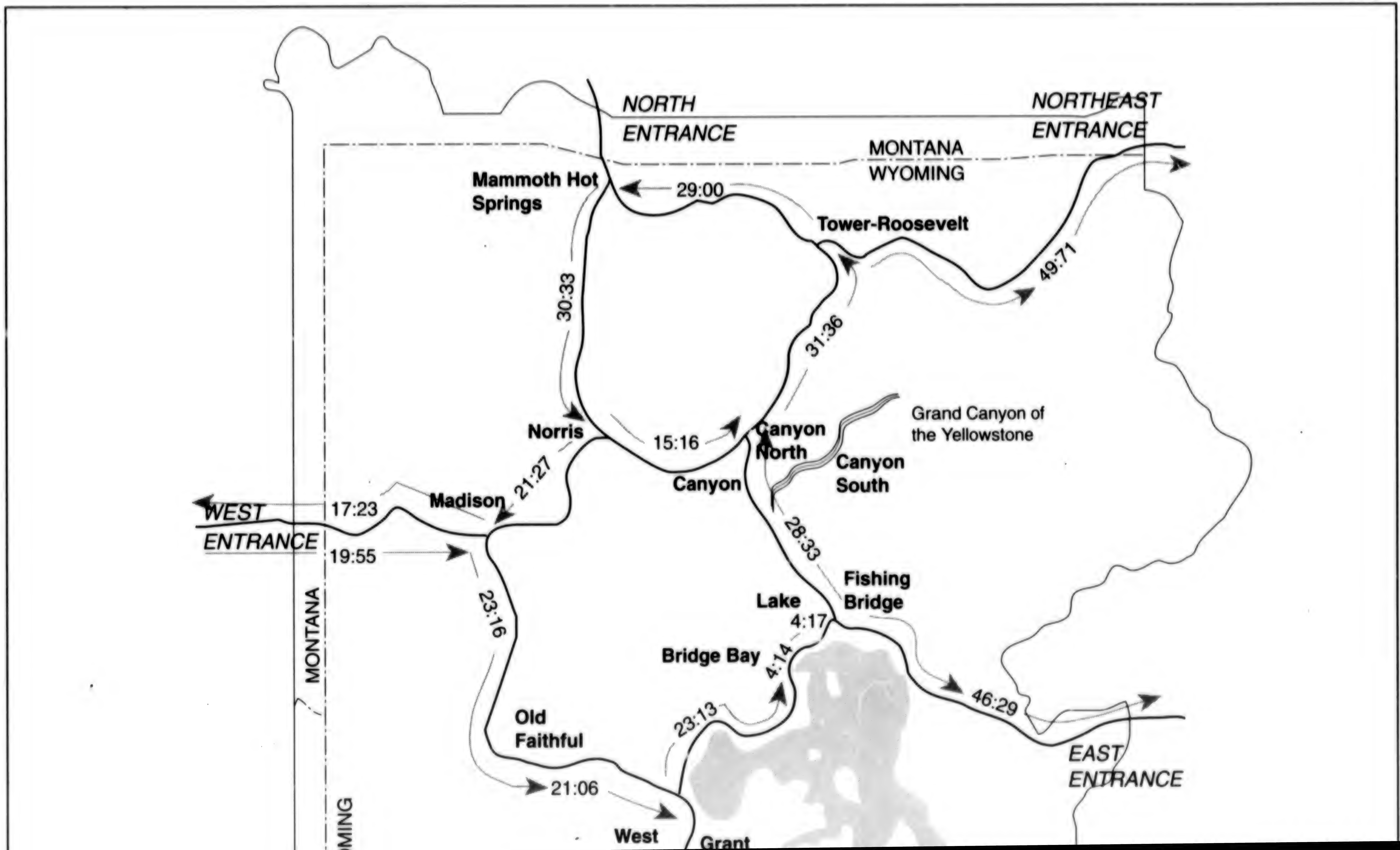


POINT-TO-POINT TRAVEL TIME

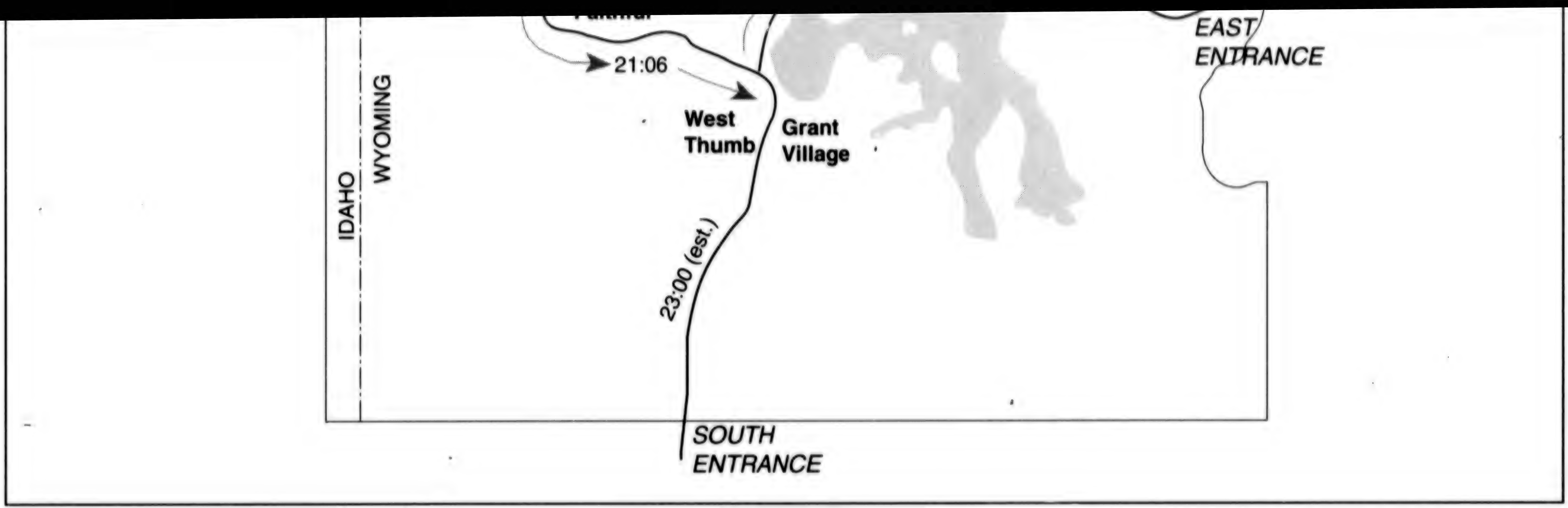


POINT-TO-POINT TRAVEL TIME

LEGEND

➤	DIRECTION OF TRAVEL (OF SURVEY)
20:00	DRIVING TIME IN MINUTES AND SECONDS

NOTE: Elapsed travel time from West Entrance counter-clockwise around the Grand Loop was 4:15:16



SECONDS

NOTE: Elapsed travel time from West Entrance counter-clockwise around the Grand Loop was 4:15:16.

Source: BRW, Inc., August, 1992

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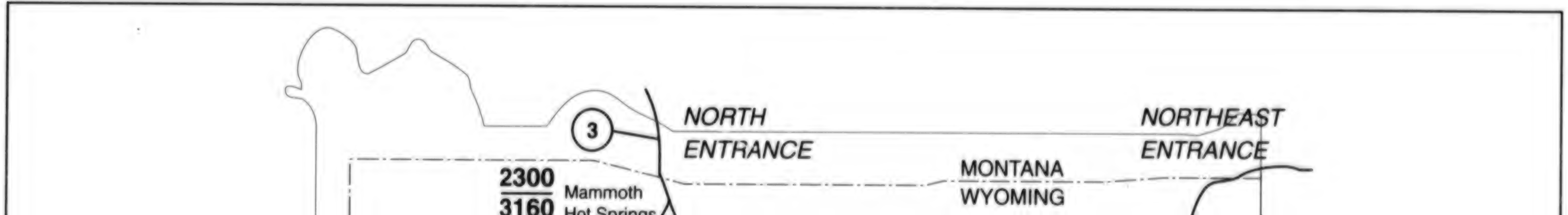
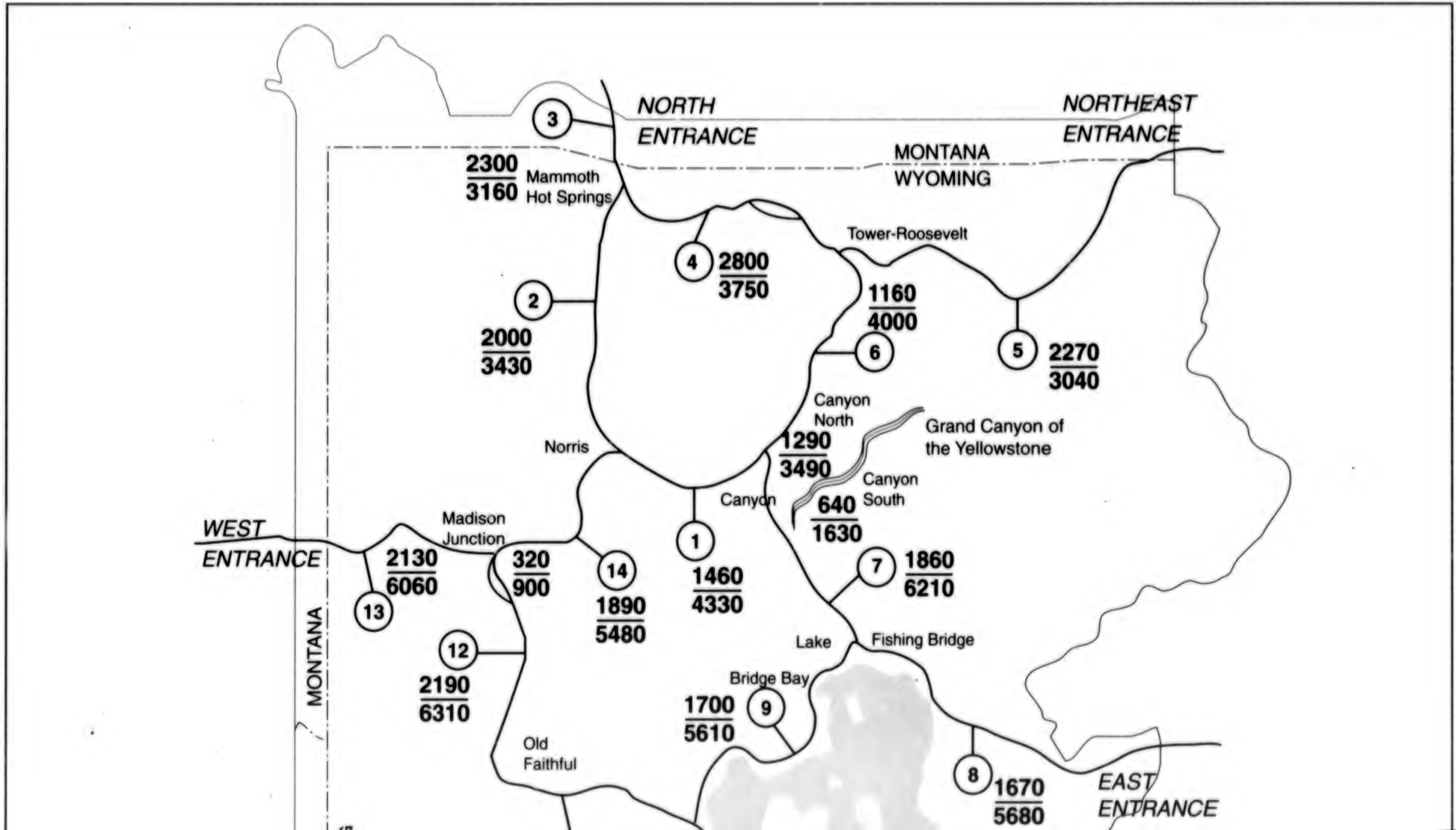


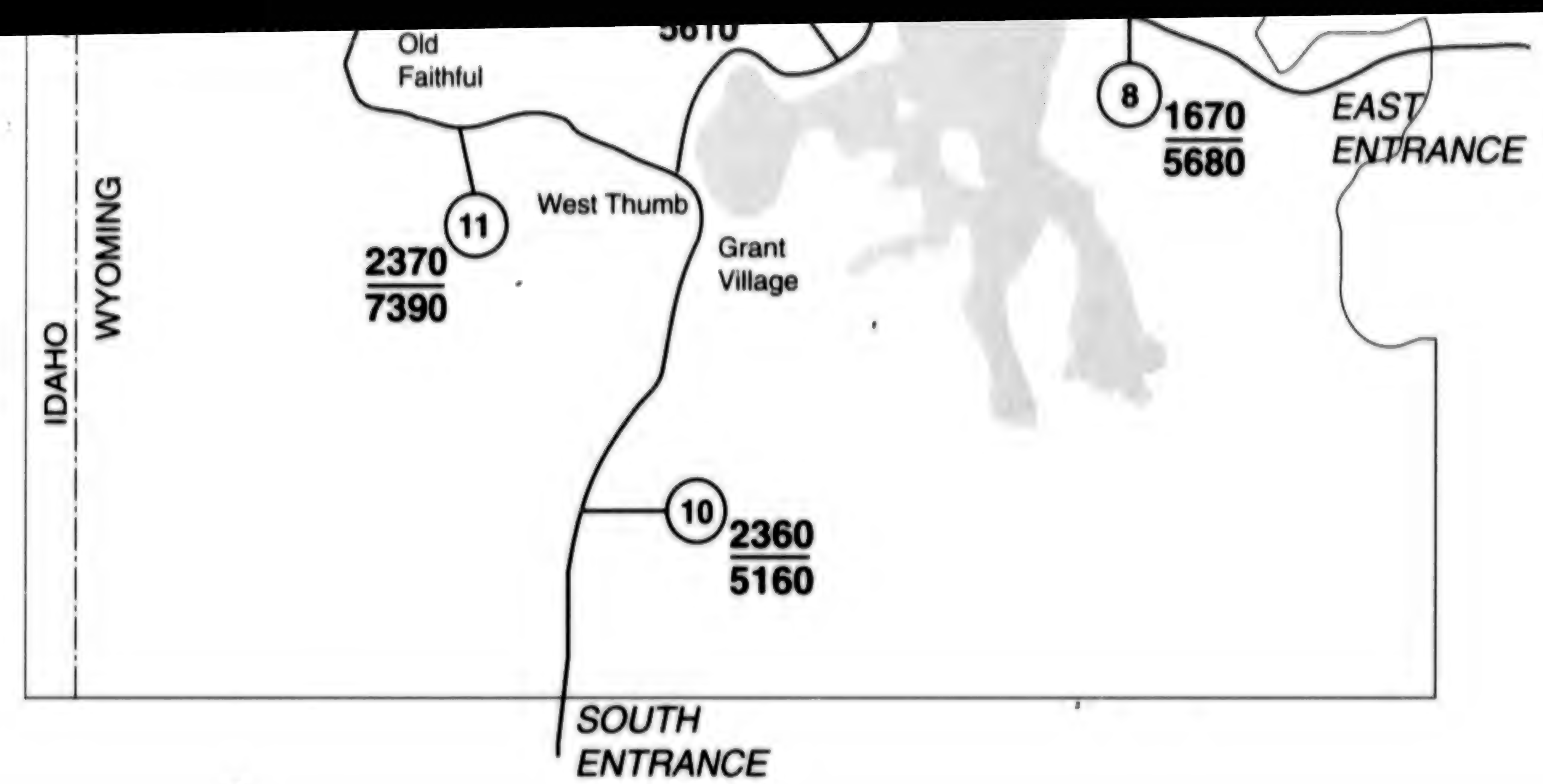
YEAR 1992 AVERAGE DAILY TRAFFIC

YEAR 1992 AVERAGE DAILY TRAFFIC



LEGEND

1670	ANNUAL ADT
5680	PEAK SEASON ADT (SUMMER)
—	MAJOR PARK ROADS



5680 PEAK SEASON ADT (SUMMER)

MAJOR PARK ROADS

Source: National Park Service Traffic Count Program, 1992

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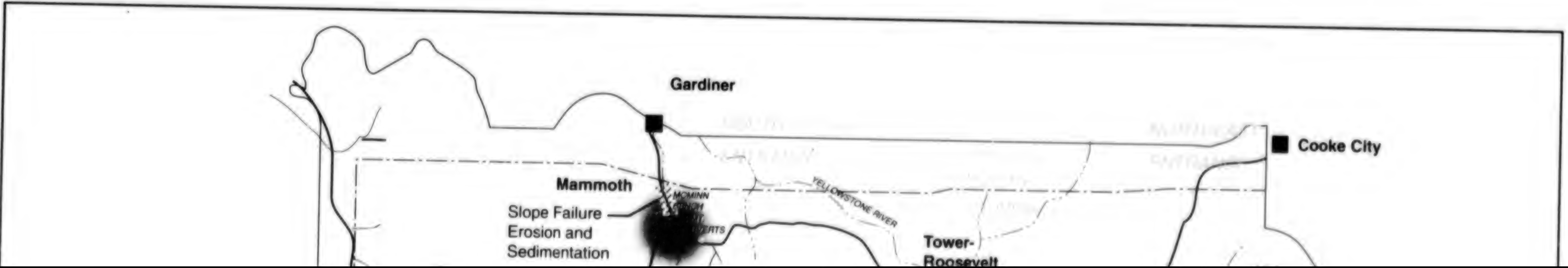
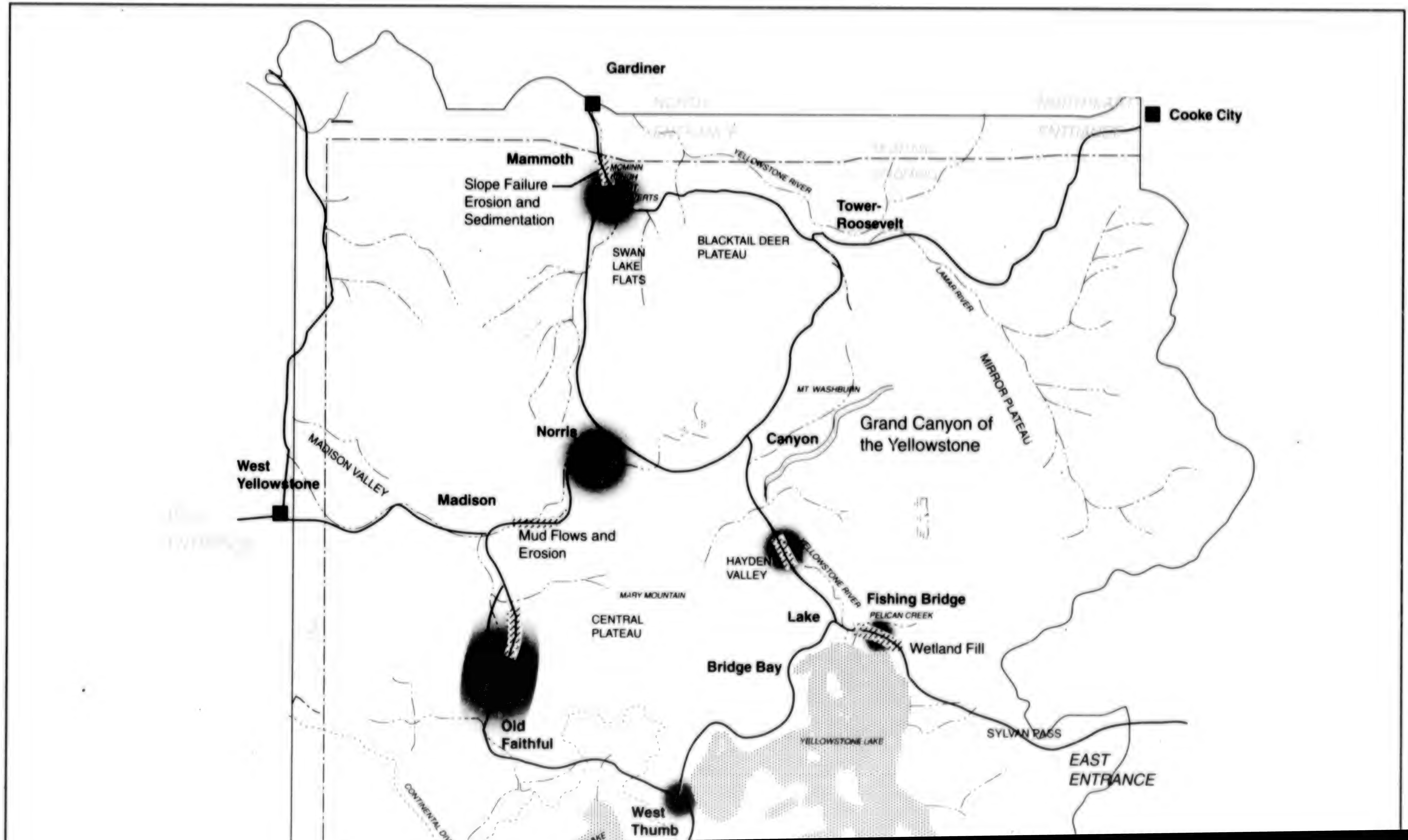


THERMAL AREAS AND SOIL ISSUES

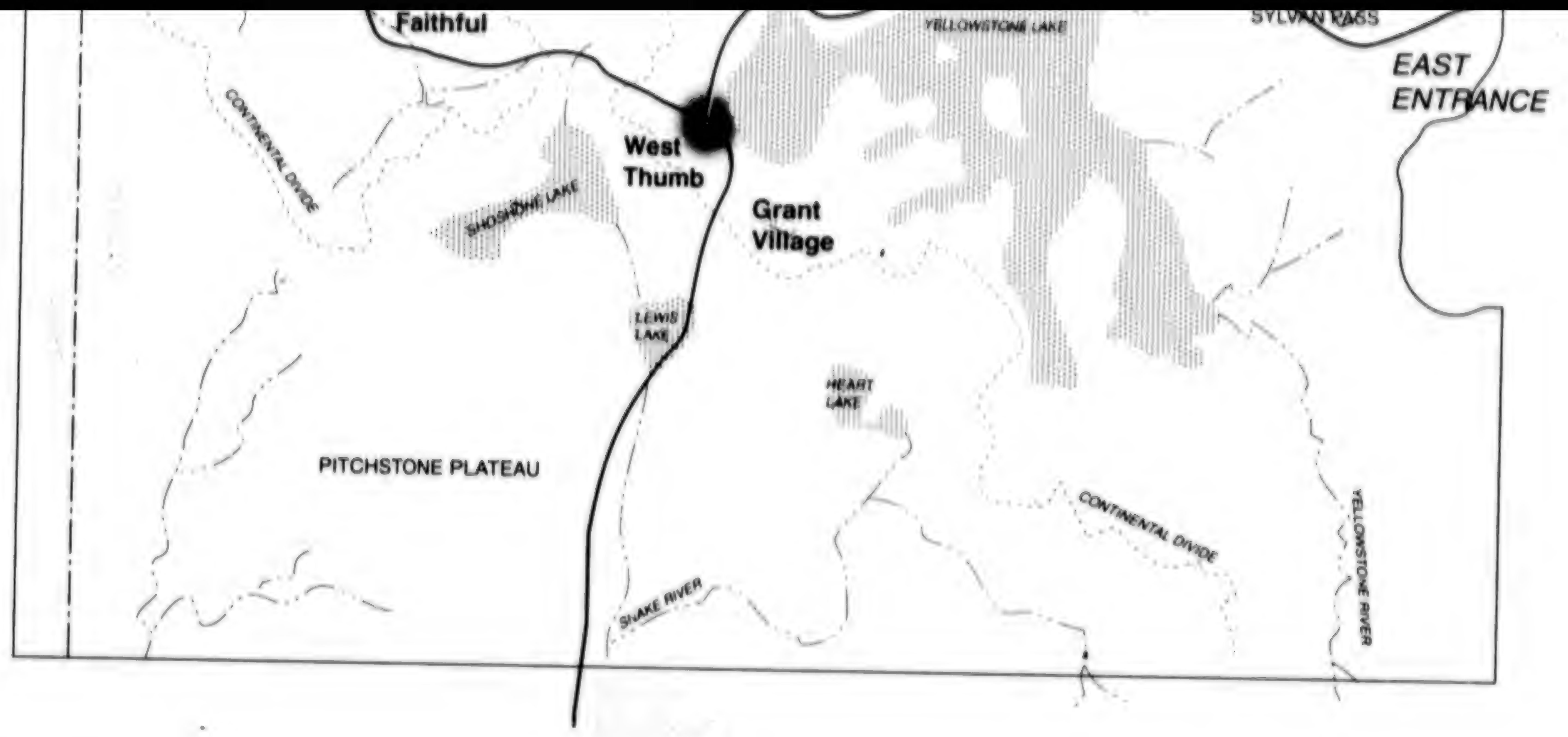
THERMAL AREAS AND SOIL ISSUES



LEGEND

ISSUES NEAR ROADWAYS

● ACTIVE THERMAL AREAS



ISSUES NEAR ROADWAYS

● ACTIVE THERMAL AREAS

▨ SOIL AND SLOPE CONCERNS

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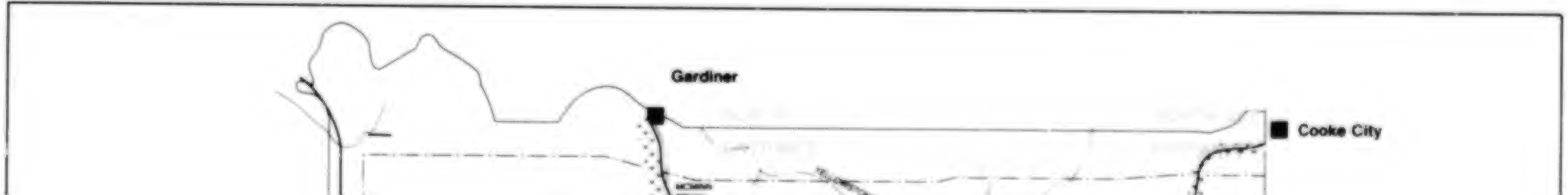
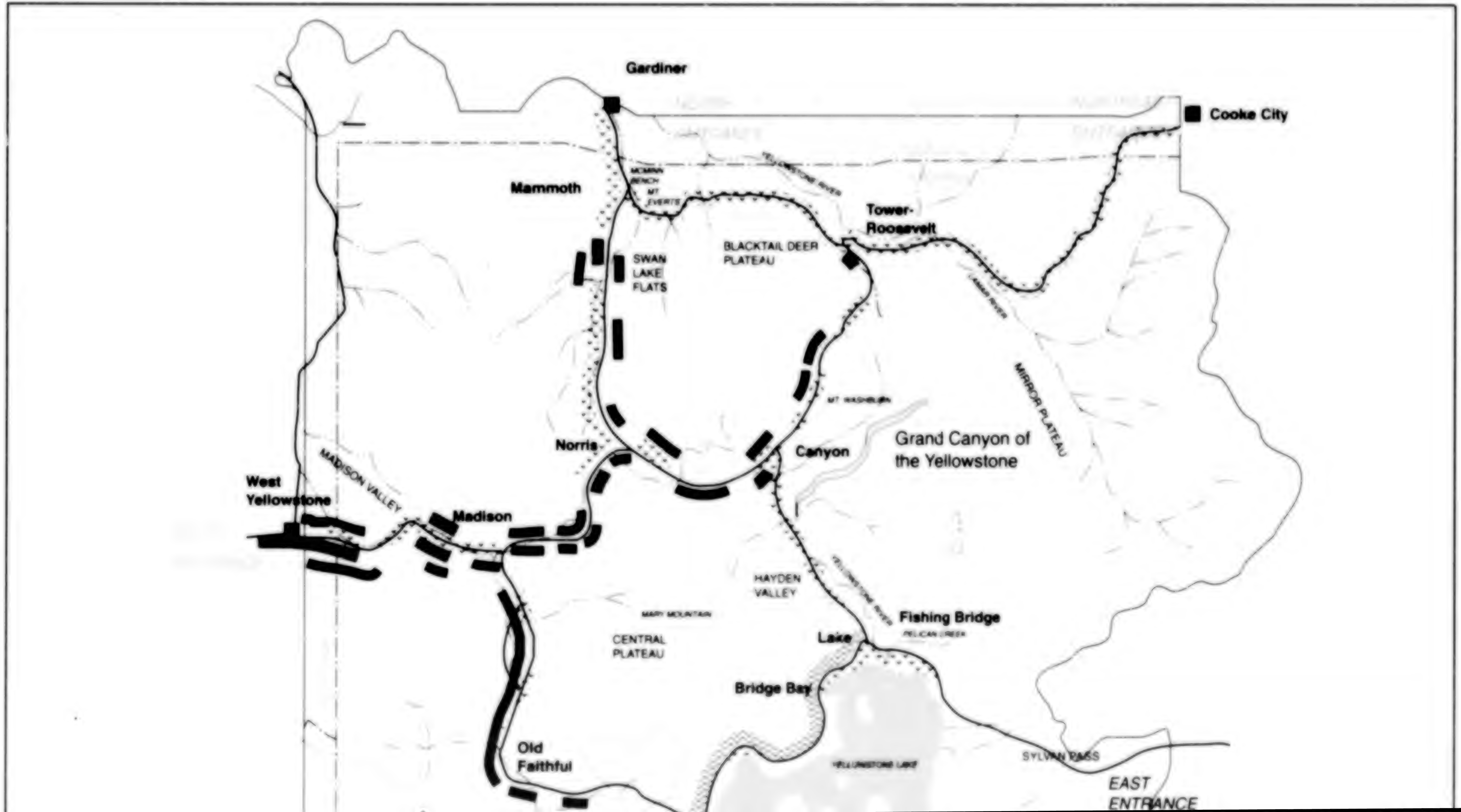


HABITAT ISSUES

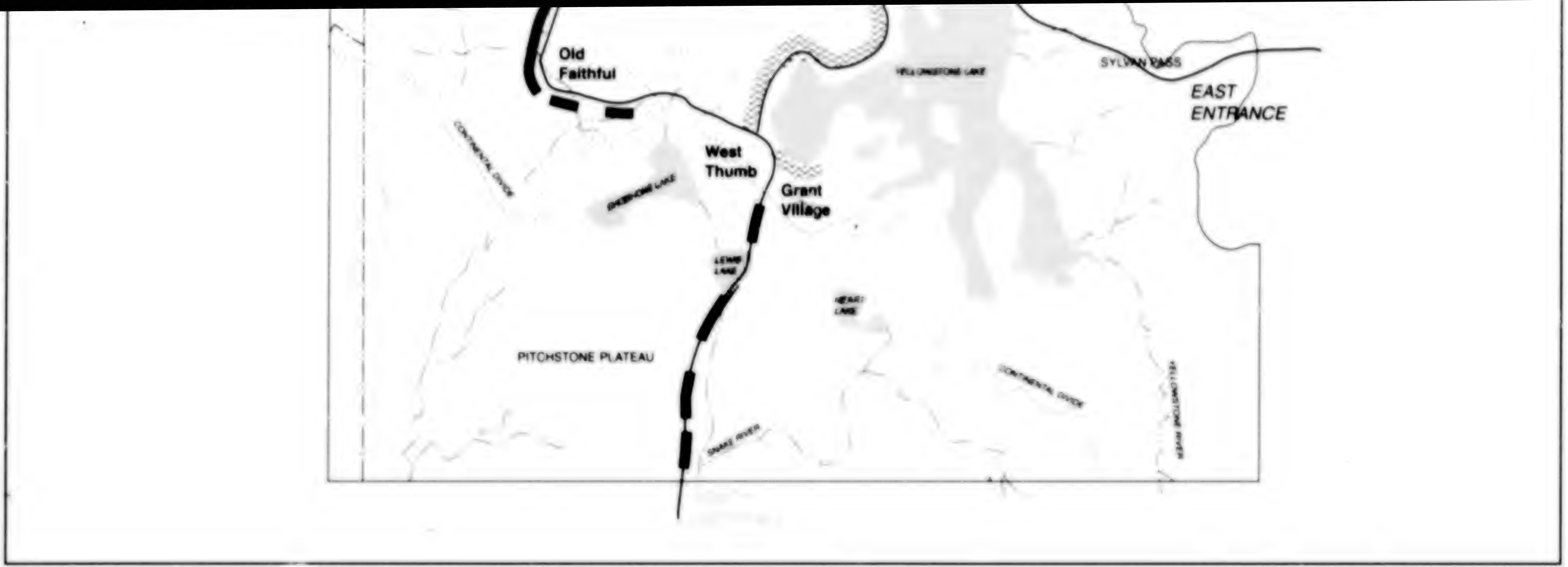
HABITAT ISSUES



LEGEND

ISSUES NEAR ROADWAYS

⋯	MEADOWS
▬	EXOTIC WEEDS (spotted knapweed, Canada thistle, Dalmation toadflax)
▨	CATEGORY II PLANTS (Ross' bentgrass and sand verbena)



thistle, Dalmation toadflax)

▨ CATEGORY II PLANTS (Ross' bentgrass and sand verbena)

▬ SEVERE BURN AREA

—·—·· STREAMS

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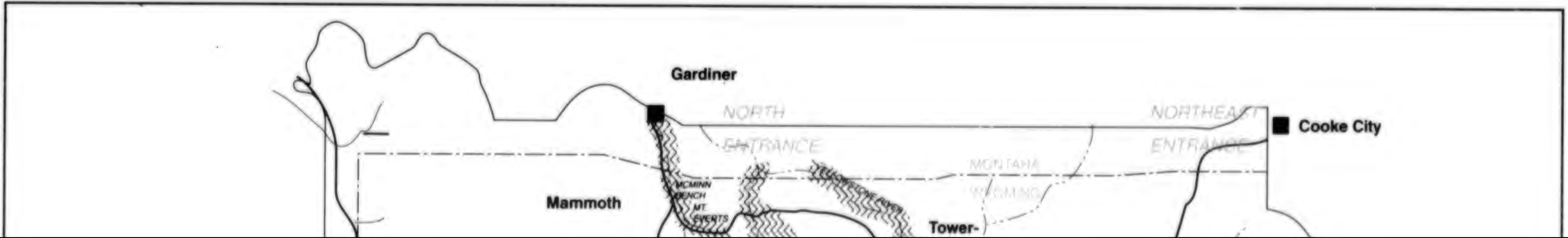
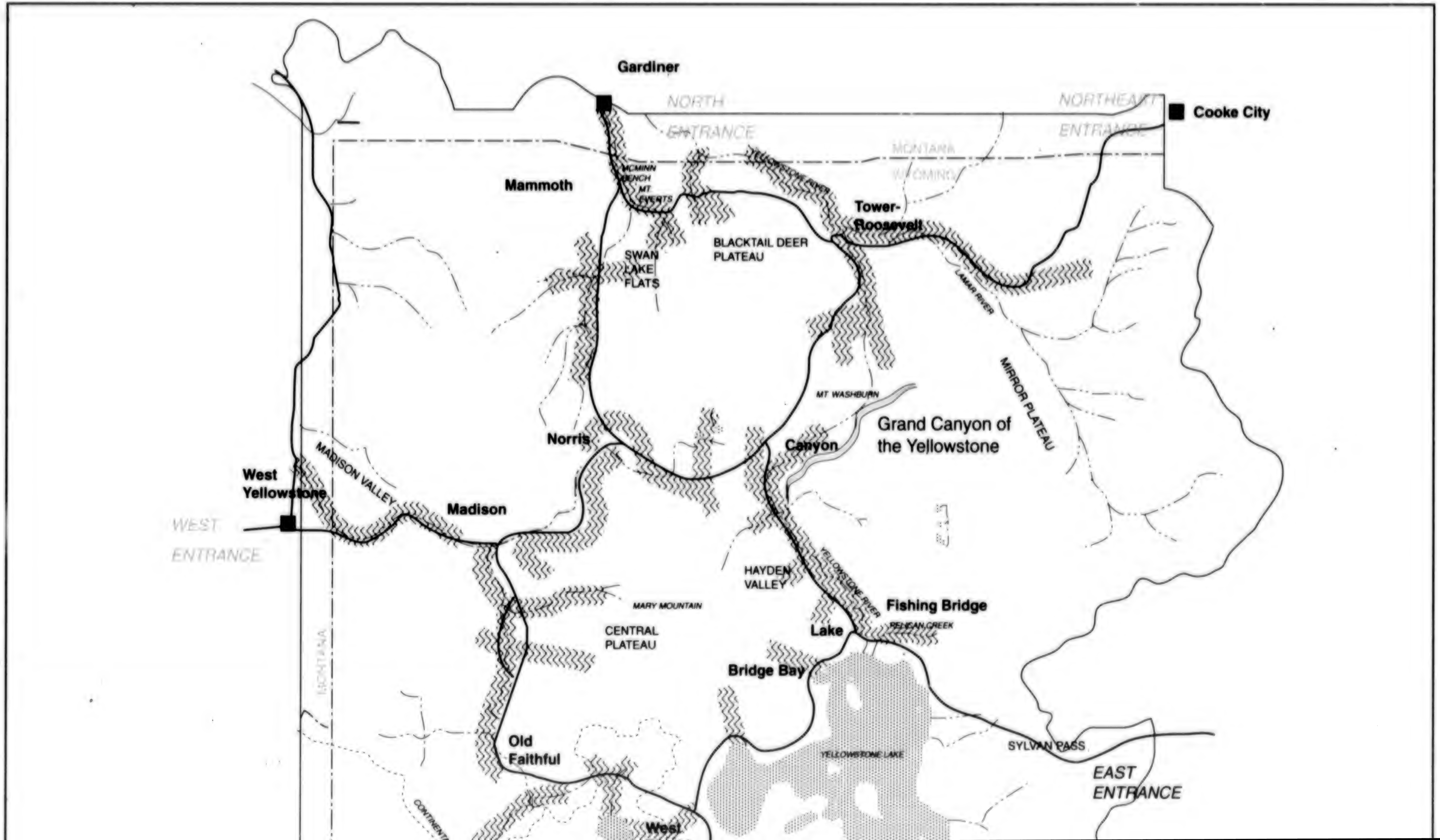


RIPARIAN AND WETLAND AREAS

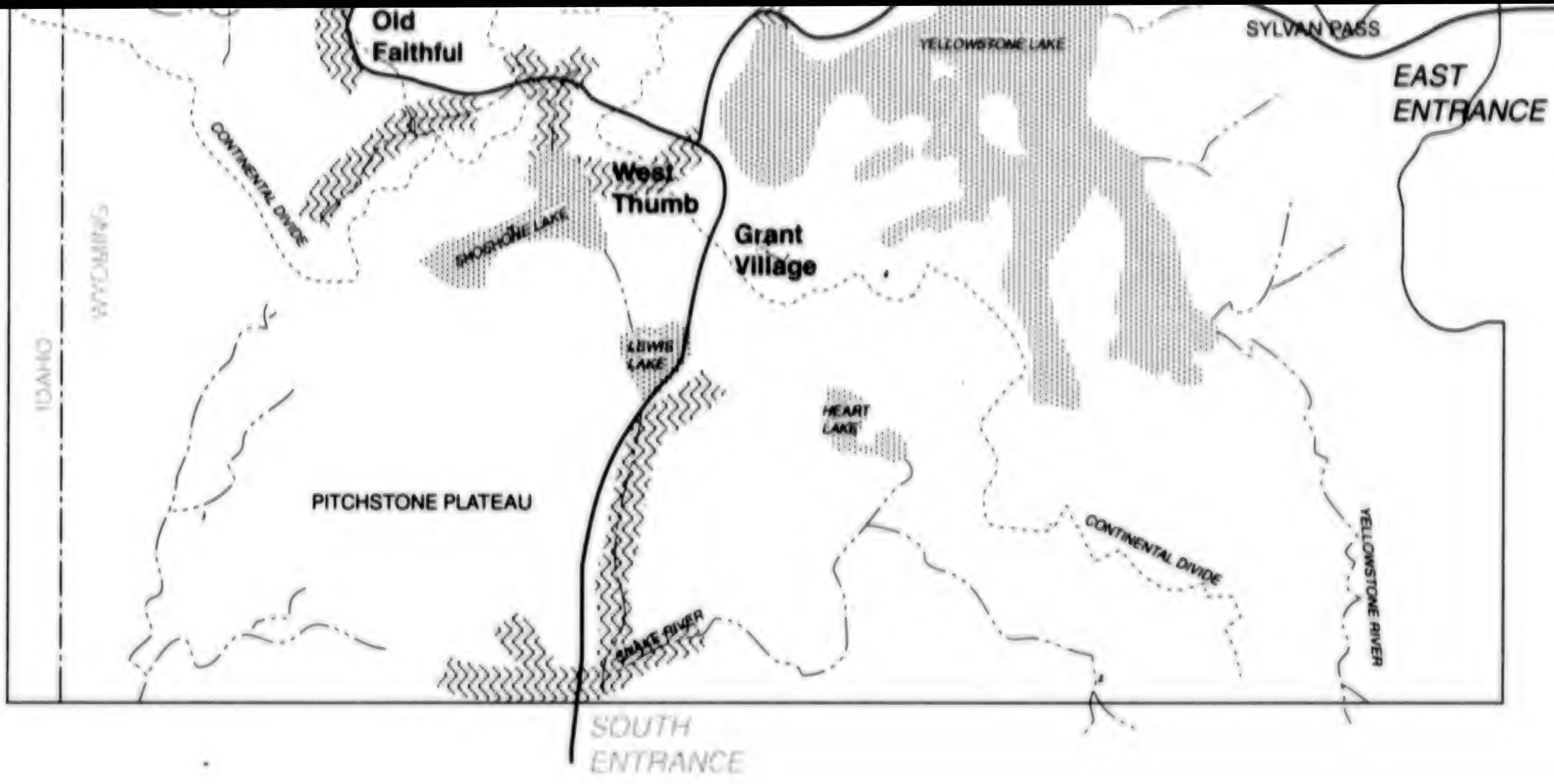
RIPARIAN AND WETLAND AREAS



LEGEND

ISSUES NEAR ROADWAYS

▨ RIPARIAN AND WETLAND AREAS



LEGEND

ISSUES NEAR ROADWAYS

▨ RIPARIAN AND WETLAND AREAS

-·-·- STREAMS

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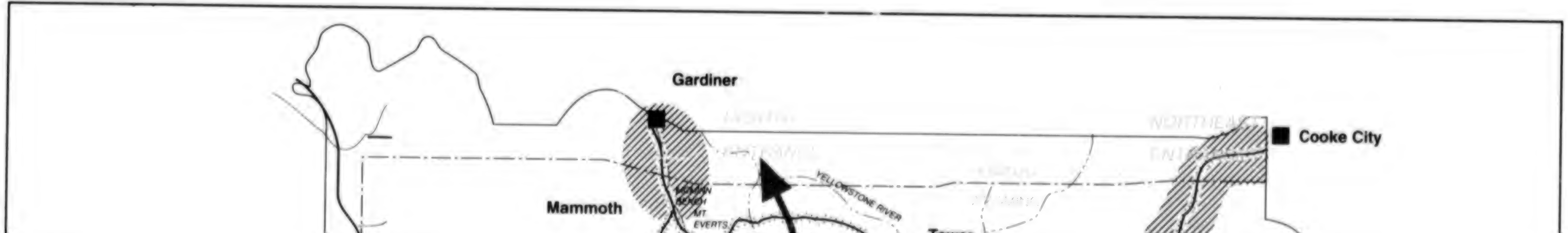
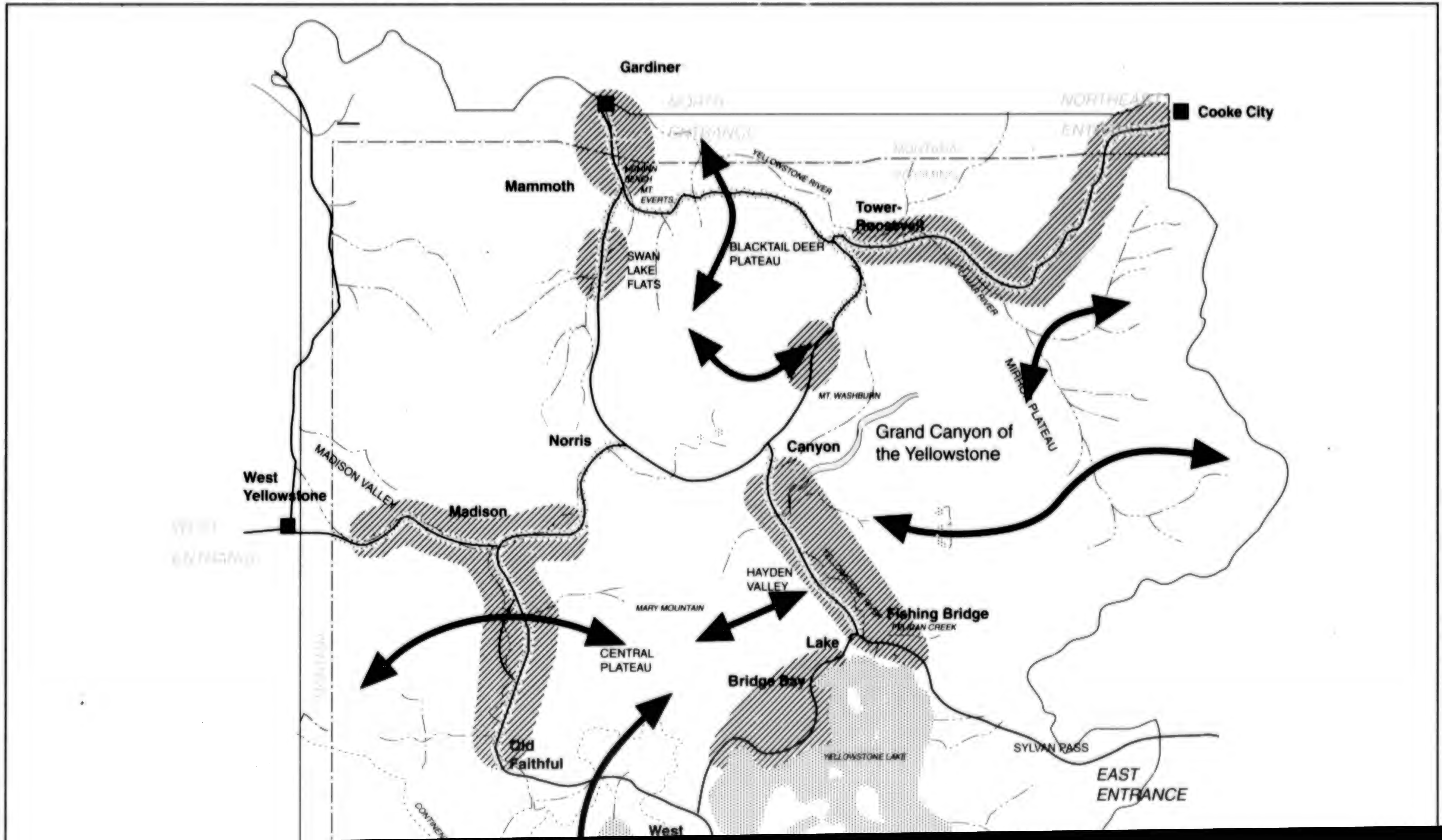


WILDLIFE AREAS AND MIGRATION ROUTES



WILDLIFE AREAS AND MIGRATION ROUTES

LEGEND

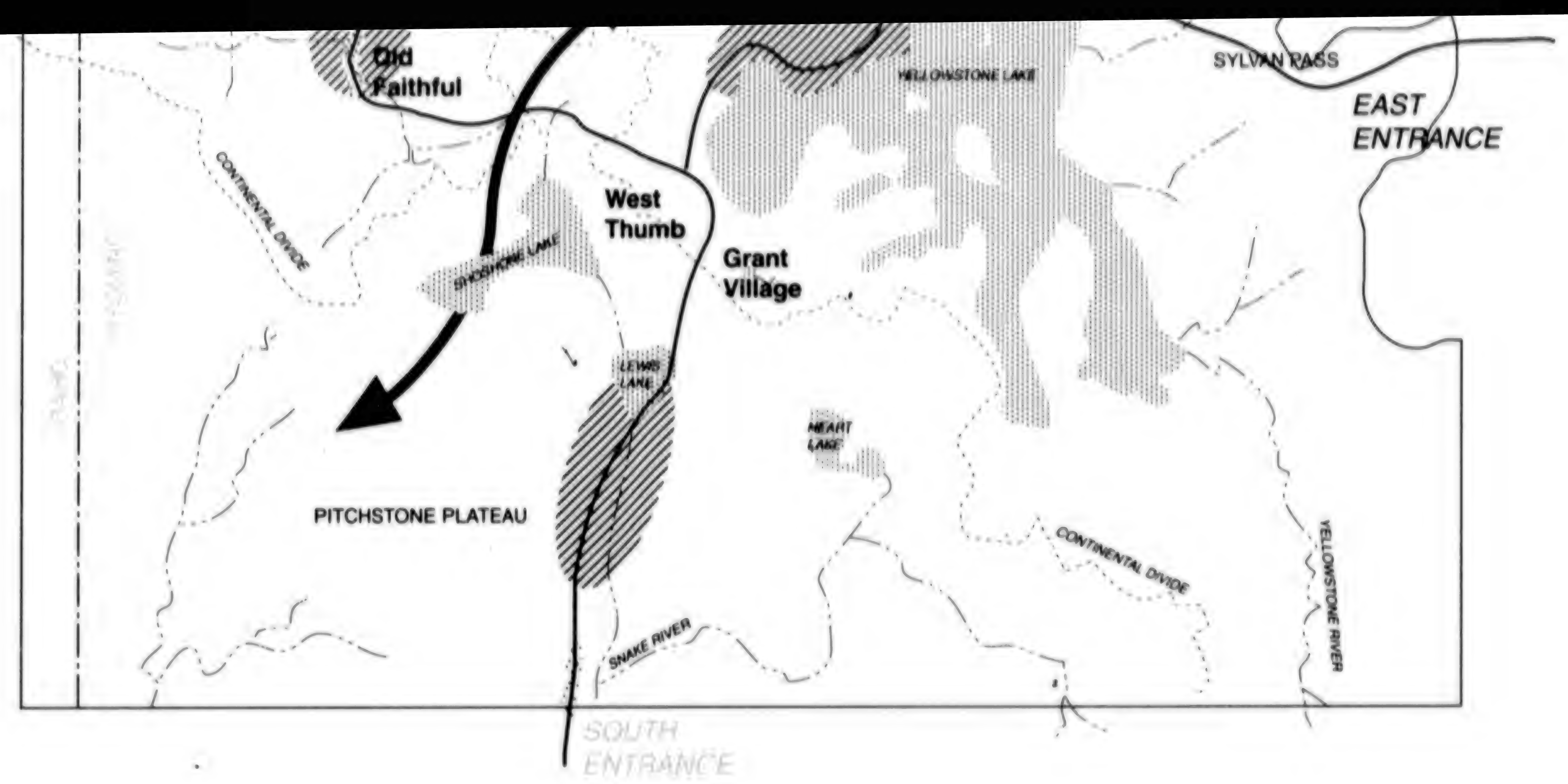
ISSUES NEAR ROADWAYS

▨ WILDLIFE AREAS

↔ SHEEP MIGRATION ROUTES

↔ BISON MIGRATION ROUTES

WINTER CONCENTRATION



⟷ SHEEP MIGRATION ROUTES

⟷ BISON MIGRATION ROUTES

▨ WINTER CONCENTRATION

—·—·— STREAMS

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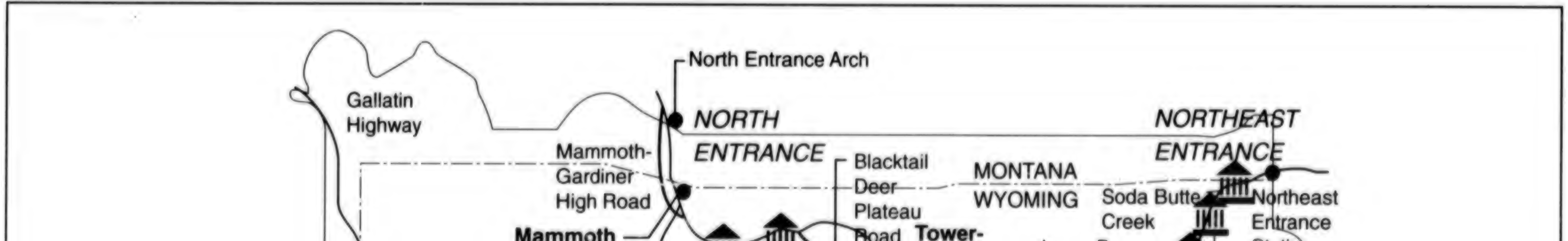
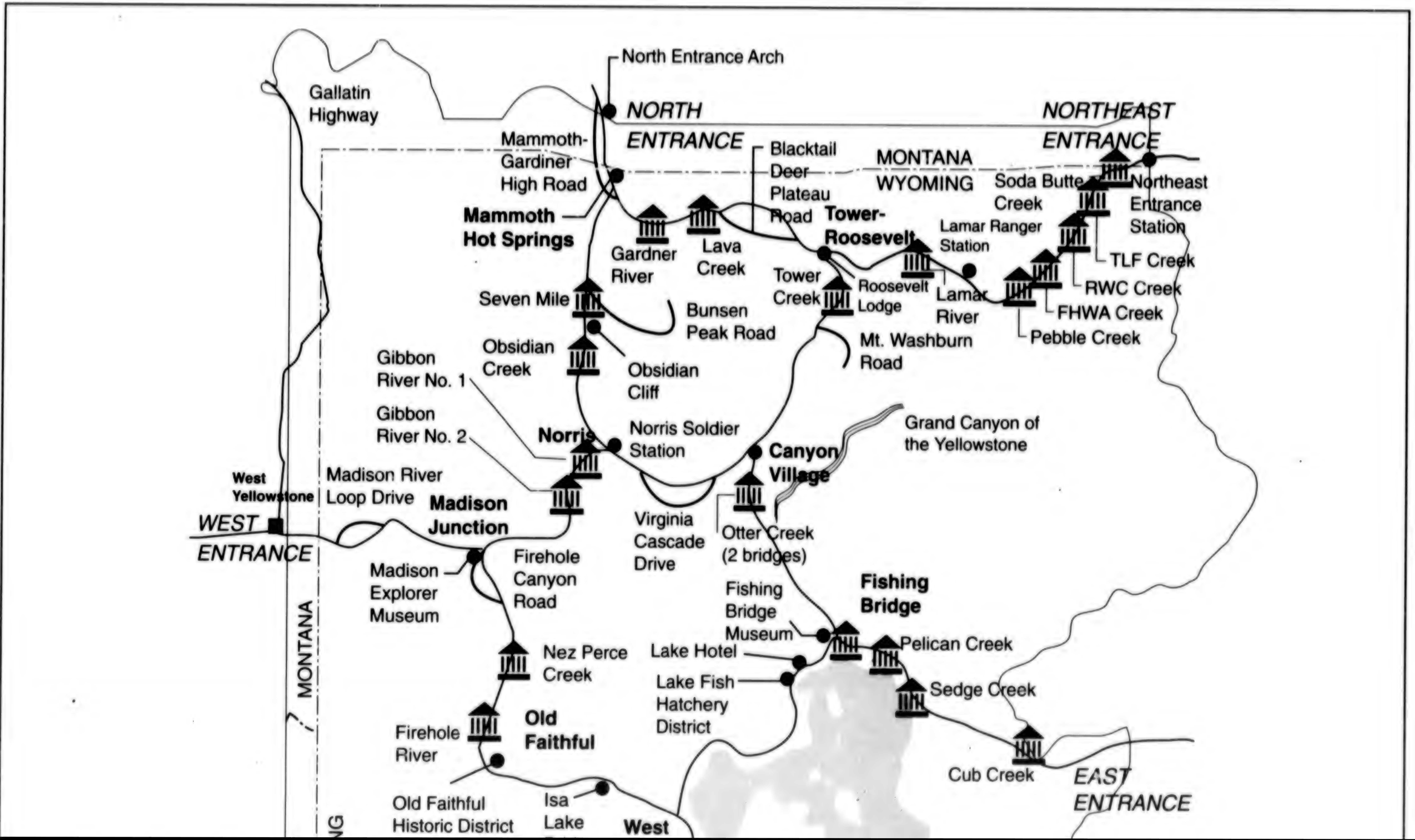


CULTURAL AND HISTORIC RESOURCES



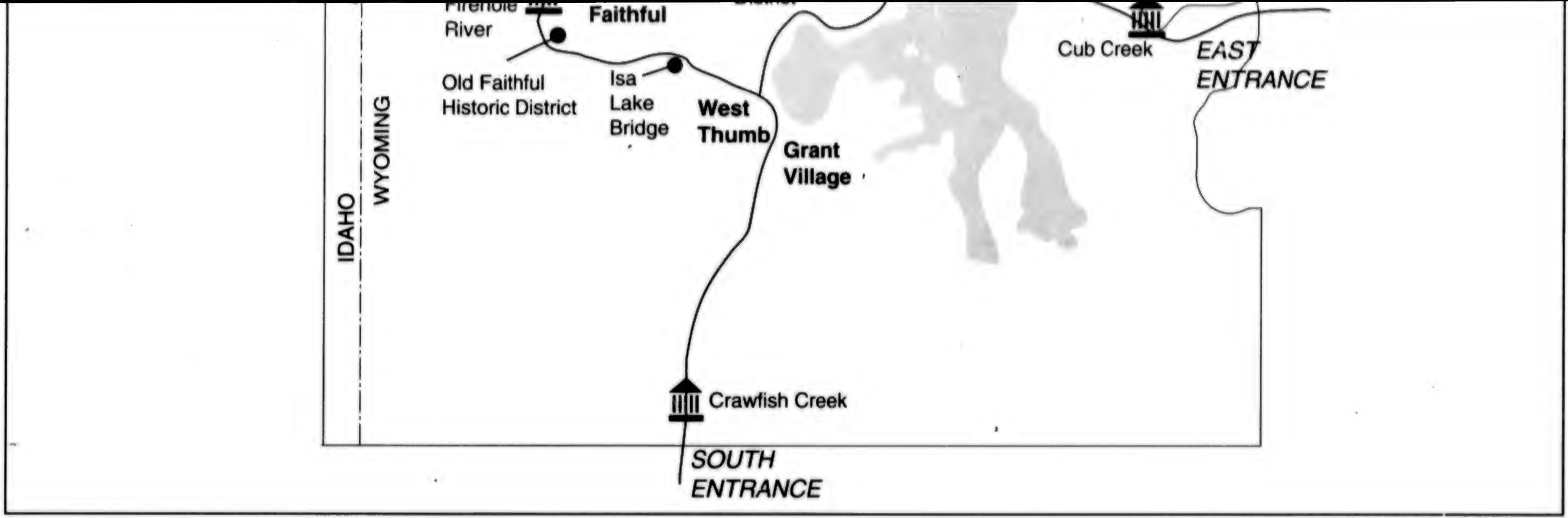
CULTURAL AND HISTORIC RESOURCES

LEGEND

RESOURCES NEAR ROADWAYS

🏛	HISTORIC BRIDGE NOMINATED FOR INCLUSION ON THE NATIONAL REGISTER OF HISTORIC PLACES
—	COLLECTOR ROAD NOMINATED FOR INCLUSION ON THE NATIONAL REGISTER OF HISTORIC PLACES
●	SITE OF SIGNIFICANT CULTURAL OR HISTORIC RESOURCES

Source: Parkwide Road Improvement Plan, Environmental Assessment, 1992 (bridges and collector roads); Draft Environmental



OF HISTORIC PLACES

● SITE OF SIGNIFICANT CULTURAL OR HISTORIC RESOURCES

Source: Parkwide Road Improvement Plan, Environmental Assessment, 1992 (bridges and collector roads); Draft Environmental Assessment, Employee Housing, 1992 (sites).

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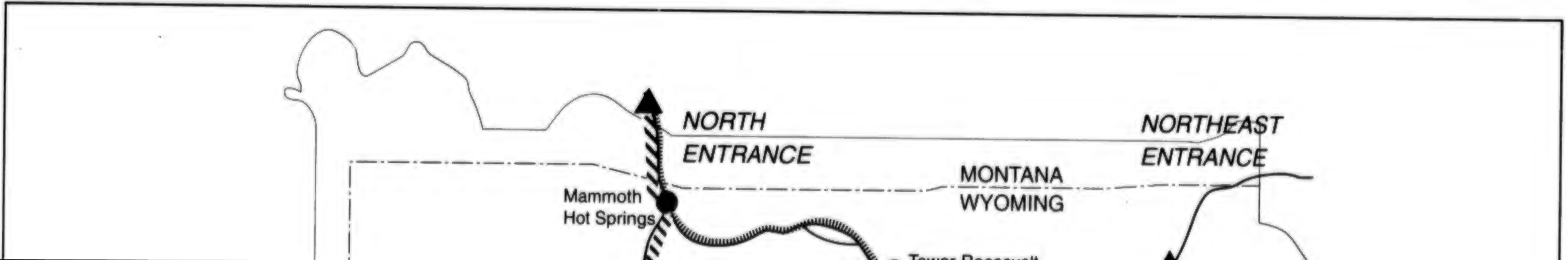
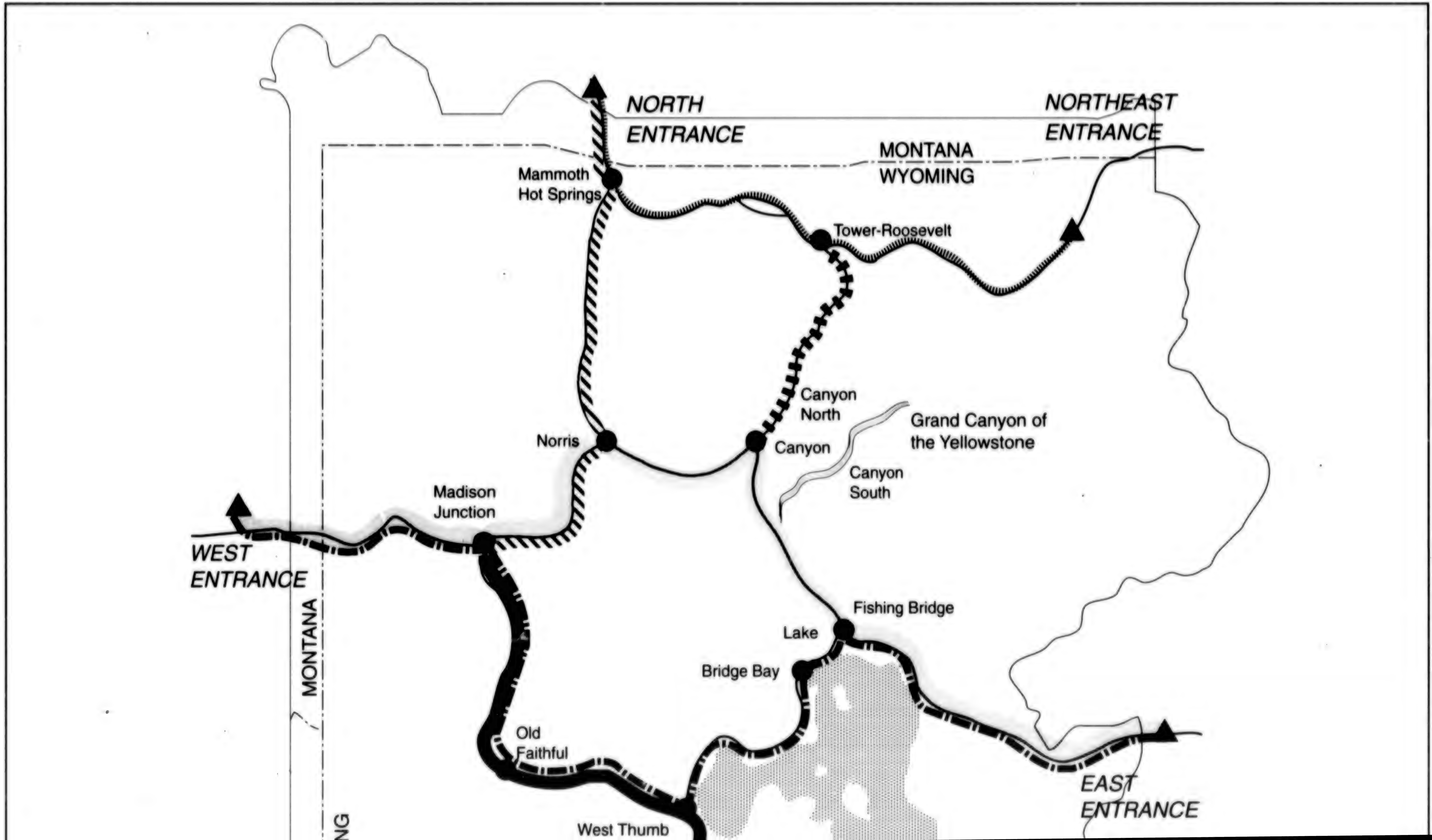
PARKWIDE VTS ALTERNATIVE

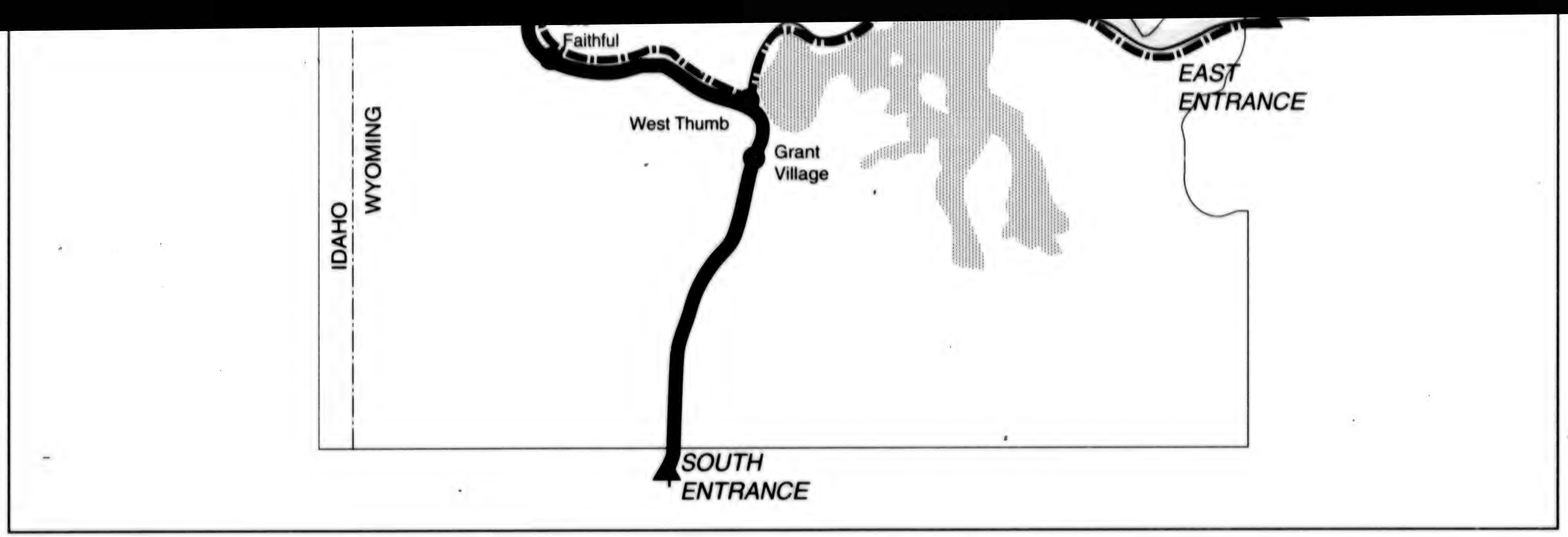




PARKWIDE VTS ALTERNATIVE

LEGEND

	TRANSIT SERVICE BETWEEN:
IIIIIIIIII	NORTHEAST AND NORTH ENTRANCES (via Tower)
\\\\\\	NORTH ENTRANCE AND MADISON JUNCTION (via Norris)
░	WEST AND EAST ENTRANCES (via Canyon)
▬ · ▬	EAST AND WEST ENTRANCES (via West Thumb)
▬	SOUTH ENTRANCE AND MADISON JUNCTION (via Old Faithful)
▮▮▮▮	TOWER-ROOSEVELT TO CANYON (via Dunraven Pass)
—	MAJOR ROADS
▲	REMOTE STAGING AREAS
●	MAJOR STOP LOCATIONS AND TRANSFER POINTS



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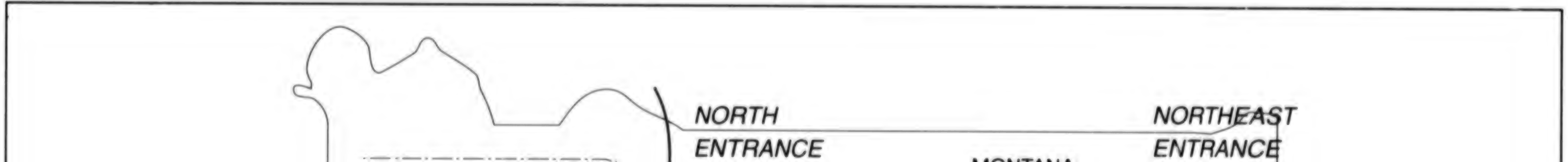
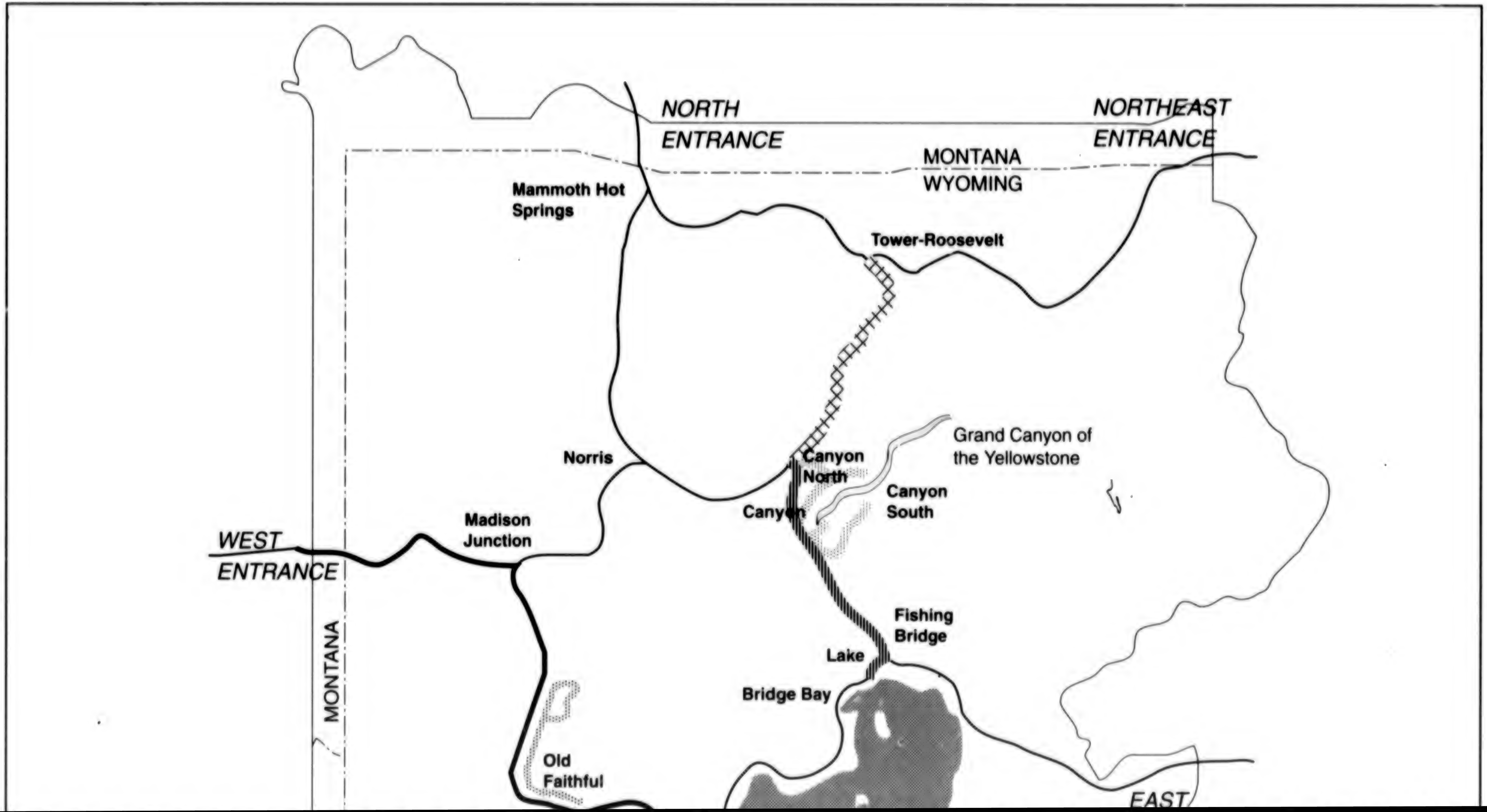


CANDIDATE AREAS FOR TRANSIT SERVICE

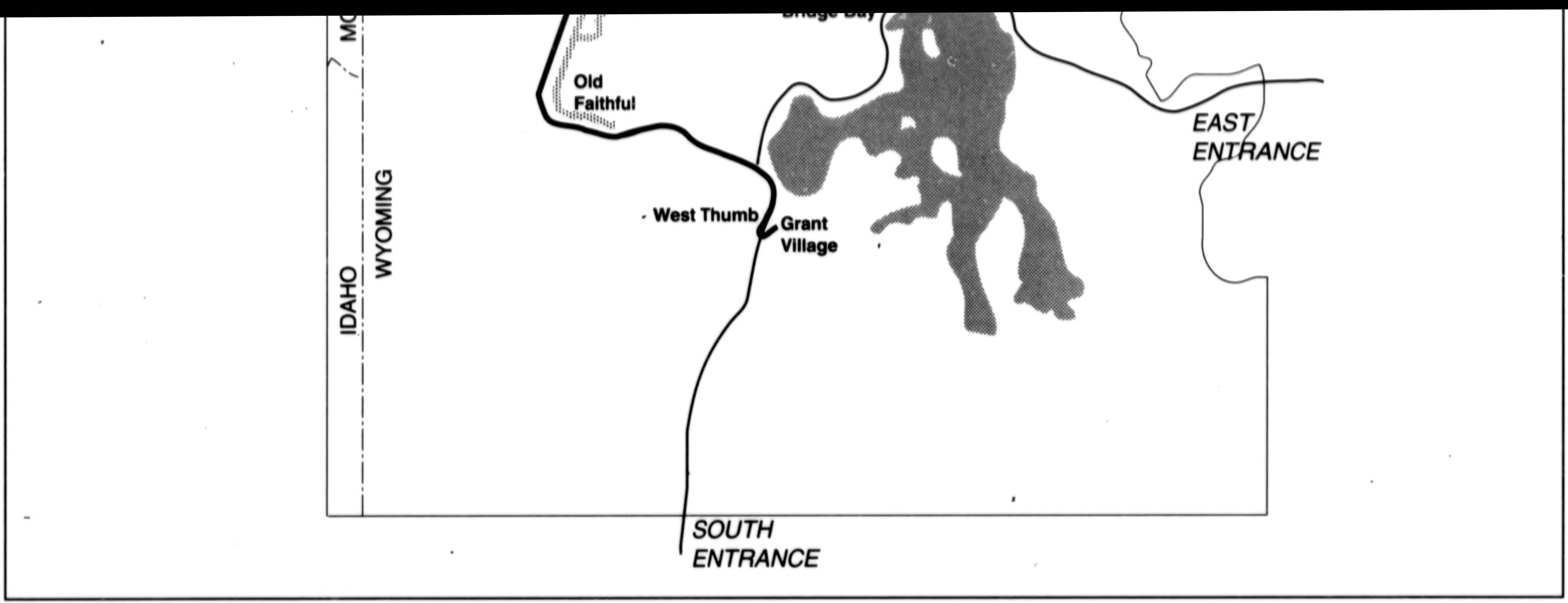


CANDIDATE AREAS FOR TRANSIT SERVICE

LEGEND

▬ WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful) SEGMENT

▨ OLD FAITHFUL AREA



WEST YELLOWSTONE TO GRANT VILLAGE (via Old Faithful) SEGMENT
OLD FAITHFUL AREA
HAYDEN VALLEY SEGMENT
CANYON AREA
XXXXX CANYON TO TOWER SEGMENT
N

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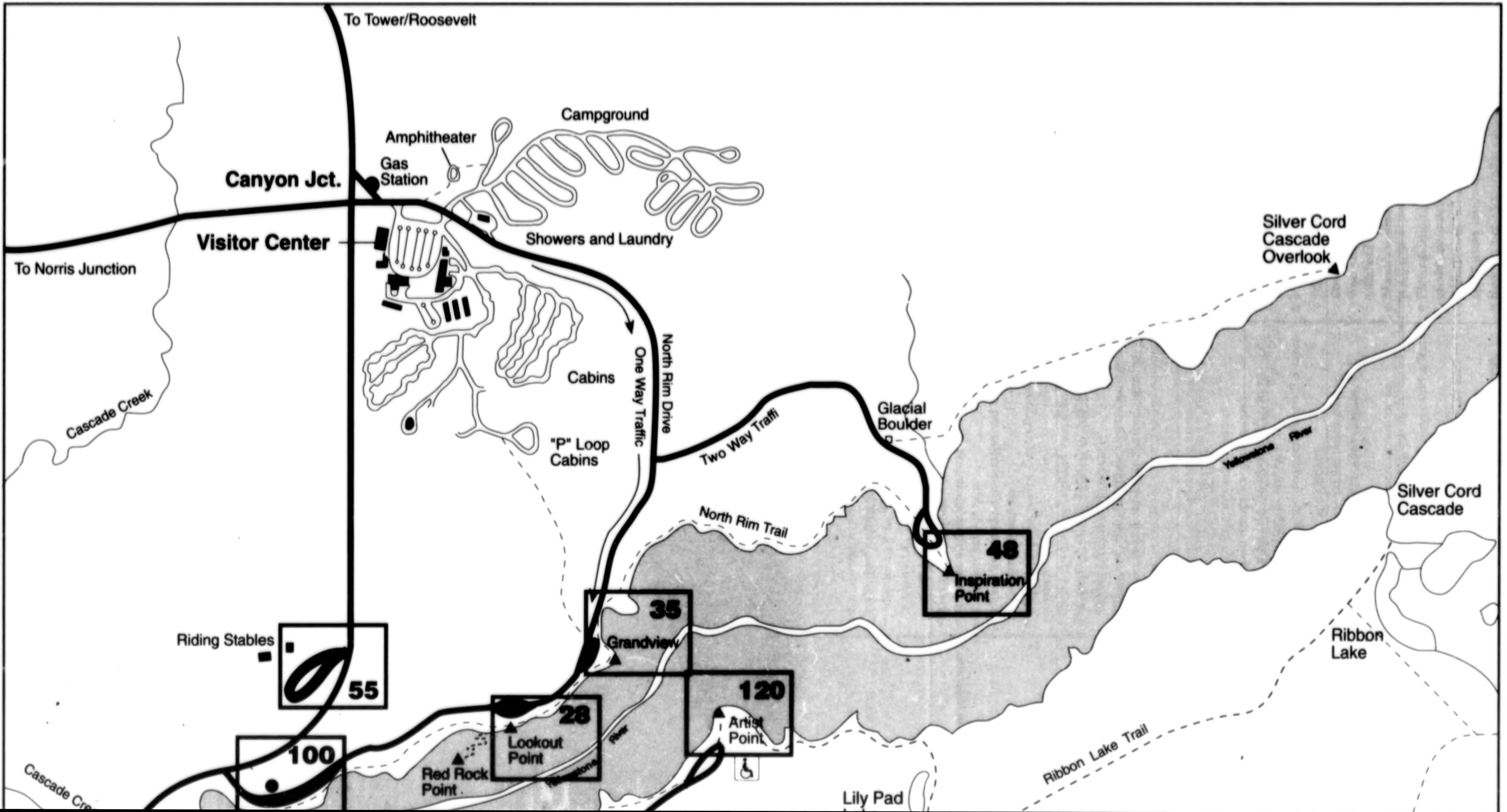
CANYON PARKING AREAS

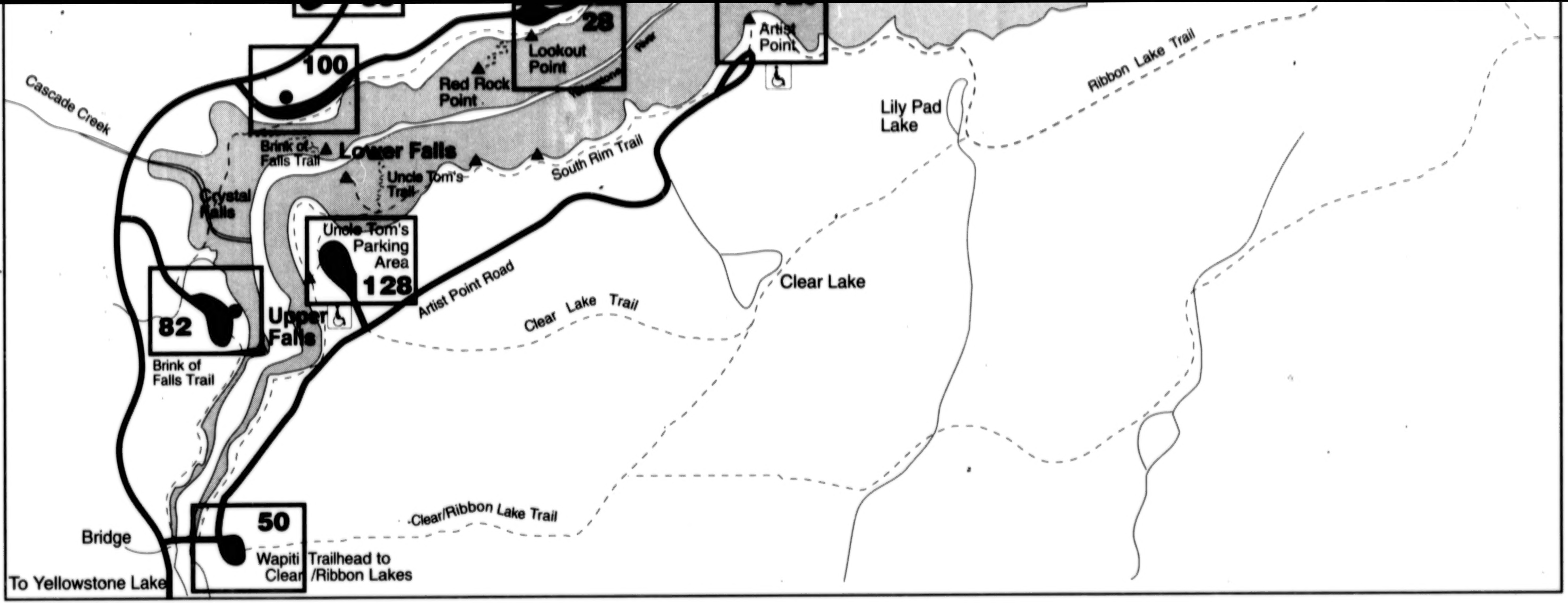
CANYON PARKING AREAS



LEGEND

●	Restrooms
▟	Buildings
═	Paved Roads
- -	Hiking Trails
▲	Viewpoints and Overlooks
♿	Handicapped Access
☐	Parking Lot Location and No. of Spaces

Source: BRW, Inc. November 1992



Source: BRW, Inc. November 1992

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